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ABSTRACT

More than 60 outdoor activities and 50 follow-up activities for children in grades two, three, and four are collected in this teacher's guide. They focus on the interdependence of life; the relationship of man, animals, and plants to each other and to the environment. Most are designed as field trips, utilizing a discovery and questioning approach to learning. Based on pilot activities conducted at the Southeastern Pennsylvania Outdoor Education Center, they were subsequently revised and adapted by the New Castle-Gunning Bedford Environmental Laboratory, an ESEA Title III project. A master key divided the major activities into categories: (1) seasonal activities, (2) flora, (3) fauna, (4) habitat studies, (5) weather, geology, soils, hydrography, and (6) awareness, man and nature. For each activity also checked are appropriate grade level(s), season(s) in which to conduct it, and coordinated follow-up activity(ies). A similar key is provided for follow-up activities indicating the major activity which it is associated with in place of the coordinated follow-up activity. Each lesson outlines objectives, procedures and/or activities on the trip, and pertinent questions. Diagrams and charts supplement some of the information. (BL)

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ENVIRONMENTAL CURRICULUM MATERIALS

LEVEL II (2-3-4)

January, 1973

INCORPORATING
the outdoor classroom
"discovery" approach
spiral sequence activities
and follow-ups

SE 015 817

These materials were developed and piloted over a period of years at the Southeastern Pennsylvania Outdoor Education Center, an E.S.E.A. Title III project administered by the Rose Tree Media School District, Lima, Pennsylvania from 1966-1971. The activities and follow-ups were written by teachers and consultants in workshops and institutes and were revised by members of the SPOEC staff and, in 1970-71, by Roger Daum, Coordinator of the New Castle-Gunning Bedford Environmental Laboratory, an E.S.E.A. Title III project.

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ACTIVITY MASTER KEY
LEVEL II

Page	Title
1	To the Teachers or Guide
3	The Interdependence of Life: The Relationship of Man, Animals, and Plants to each other and to the Environment
5	A Dozen Concepts.....for Environmental Education

Seasonal Activities			Level K	1	2	3	4	5	6	Season*	Follow-Up
Act#1	7	SIGNS OF FALL: Deciduous & Evergreen Trees	x	x	x	x	x			F	1,26,27
Act#2	8	SIGNS OF FALL: Woods			x	x	x			F	1
Act#3	9	FALL & WINTER BUDS			x	x	x			F,W	3
Act#5	11	SEED DISPERSAL: Field & Forest	x	x	x	x	x	x	x	F	21,22,59
Act#6	12	WOODS IN THE FALL			x	x	x			F	1,26,27
Act#8	16	WINTER COLOR			x	x	x			W	5
Act#9	18	WINTER OUTDOORS	x	x	x	x	x			W	6,8
Act#10	23	OBSERVING BIRDS AT A FEEDER	x	x	x	x	x			W	8,45,49,52
Act#12	28	SIGNS OF SPRING	x	x	x					Sp	13,41,44
Act#13	31	SIGNS OF SPRING: Spring Green	x	x	x	x	x			Sp	13,75
Act#15	34	SIGNS OF SPRING OR FALL	x	x	x	x	x			F,Sp	75
Act#16	36	TREE BUDS					x	x	x	Sp	3,9
Act#17	38	BIRD HOMES			x	x	x			Sp	12,46,49
Act#19	42	FLOWERS			x	x	x	x	x	Sp	10,11
Act#21	46	BUDS ON TREES			x	x	x	x	x	W,Sp	24
Act#35	71	LEAVES: Writing a Cinquain			x	x	x			F	31
Flora											
Act#22	48	FUNGUS ON LOG	x	x	x	x				All	56
Act#23	49	SPORE-BEARING PLANTS					x	x	x	F,Sp,Su	15
Act#24	51	DECOMPOSERS					x	x	x	F,Sp,Su	14,15,17,18
Act#29	61	FLOWER FUNCTION				x	x	x	x	Sp,Su	9
Act#31	65	STEMS AND BUDDING					x	x	x	All	9,24,25
Act#33	68	TREES: Color, Shape, Texture	x	x	x	x	x			F,Sp,Su	26
Act#34	69	TREES			x	x	x			F,Sp,Su	26,27,56
Act#36	72	CONIFERS					x	x	x	All	26,80,81

ACTIVITY MASTER KEY
LEVEL II cont.

	PAGE	TITLE	Level K	1	2	3	4	5	6	Season	Follow-Up
Fauna											
Act#37	73	INSECTS AND PLANTS					x	x	x	F,Sp,Su	
Act#38	75	OBSERVING INSECTS			x	x	x			F,Sp,Su	35
Act#44	89	SIGNS OF ANIMALS			x	x	x			All	41,44
Act#45	91	ANIMAL HOMES	x	x	x	x				All	44
Act#48	99	BIRDS	x	x	x					F,Sp,Su	45
Act#49	100	BIRDS					x	x	x	F,Sp,Su	46,47,50,51
Act#50	102	HEARING AND DESCRIBING BIRDS					x	x	x	F,Sp,Su	49,50,52
Act#51	104	FIELD STUDY OF BIRDS					x	x	x	F,Sp,Su	47,48,50,51
Habitat Studies											
Act#53	109	ANIMAL TRACES IN WOODED AREAS					x	x	x	All	41,42,43
Act#54	112	FINDS			x	x	x			All	77
Act#55	113	PLOT STUDY			x	x	x			F,Sp,Su	70,72
Act#56	114	MATURE FOREST: Layers					x	x	x	F,Sp,Su	42
Act#57	115	COMPARISON OF WOODS, FIELD AND MARSH		x	x	x				F,Sp,Su	59,60,61
Act#58	116	FOREST AND FIELD					x	x	x	F,Sp,Su	54
Act#59	117	COMPARISON OF CONIFEROUS AND DECIDUOUS WOODS			x	x	x			All	13
Act#60	119	FALLEN TREES			x	x	x			F,Sp,Su	56
Act#61	120	AWARENESS-PINE WOODS			x	x	x			F,Sp,Su	80,81
Act#64	126	STREAMS			x	x	x			F,Sp,Su	53,55
Act#65	127	STREAM STUDY				x	x	x	x	F,Sp,Su	53,58
Act#66	129	POND SUCCESSION					x	x	x	F,Sp,Su	65,66
Act#67	131	MARSH: Plant Life				x	x	x		F,Sp,Su	63
Act#68	132	MARSH: Animal Life			x	x	x	x		F,Sp,Su	53,55,61,62
Act#69	133	MARSH LIFE				x	x	x		F,Sp,Su	53,55
Act#70	135	MARSH LIFE			x	x	x			F,Sp,Su	53,55
Weather, Geology, Soils, Hydrography											
Act#73	143	ANY RAINY DAY			x	x	x			F,Sp,Su	67
Act#74	145	RAINY DAY	x	x	x					F,Sp,Su	67
Act#76	147	RAINY DAY					x	x	x	F,Sp,Su	68
Act#77	150	RAINY DAY: Woods and Marsh-			x	x	x			F,Sp,Su	67

ACTIVITY MASTER KEY
LEVEL II cont.

	PAGE	TITLE	Level K	1	2	3	4	5	6		Season	Follow-Up
Weather, Geology, Soils, Hydrography												
Act#78	152	WINDY DAY IN A FOREST------	x	x	x	x	x	x	x		All	68
Act#79	153	ROCKS AND MINERALS---------				x	x				All	73
Act#80	154	ROCKS AND MINERALS---------					x	x	x		All	73
Act#81	156	CHARACTERISTICS OF ROCKS---	x	x	x						All	-
Act#82	157	SOIL-----------------------				x	x	x	x		F, Sp,Su	16-18,69-72
Act#83	159	EROSION (RAINY DAY)--------				x	x	x	x		All	67
Awareness, Man and Nature												
Act#85	163	SHAPES AND PATTERNS--------		x	x	x					F,Sp,Su	26,77
Act#86	164	SYMMETRY-------------------			x	x	x				F,Sp,Su	27
Act#87	165	OBSERVING WITH SENSES			x	x	x				All	75
Act#88	167	MAN AND HIS WORLD----------			x	x	x	x	x		All	57,74,76,78, 79,82

* F=fall, W=winter, Sp=spring, Su=summer, All=all seasons

TO THE TEACHER OR GUIDE

This is a guide and not to be considered the alpha and omega of a field trip. No one can foresee all the variables of events or interests of children.

Children in the first years of school have an extremely short attention span. They love to be "detectives" or "explorers". First year children differ in experiential backgrounds, so language development and concepts vary greatly.

At all levels:

Do not talk down to the children, but be clear, concise and use proper names.

Give only as much information as the children can assimilate and recall fairly easily. The object is to stimulate, motivate, and interest the child in the out-of-doors. Suggest that an especially interesting feature of the trip would be a good topic for further investigation at school.

Be sure the children are dressed for the weather and the out-of-doors. Clothing that is adequate for a ten minute recess on a paved playground may be uncomfortable for an hour in a snowy or muddy woods.

Establish ground rules and the reasons for the rules at the trip site just before you begin. (Some general rules are necessary for any outdoor area that will be visited by many people). This can be done by questions to involve the child such as: "What can you do or not do during the trip to keep the area as nice as it is now?" "What is the reason for this rule?" We have had success in asking that three rules be followed:

1. Be careful to protect plants and animals from harm.
2. Keep trash with you.
3. Leave even the most interesting things for others to see.

Suggest "What you can do during the trip is use your senses."
The concept of five senses may be new to younger children while the older ones are usually familiar with it.

During the trip remain with the general topic and the format of questioning the children as in the O.E.C. Activity Sheets, but don't try to follow the sheets word for word. Use the objects discovered and the events of the trip as they occur, and if possible relate to the trip topic. All living things in an environment are so interdependent this is usually very easy.

Try to have the children answer their own questions by questioning them.

Example:

Trip topic is Animals. Child picks up a walnut shell with a hole in it. An imaginary but typical exchange could be:

C: "What's this?"
A: "What do you think?"
C: "I don't know."
A: "Is it a leaf? a flower? a pineapple?"
C: (Looking at guide oddly) "No, it's a nut of some kind."
A: "Do you think it grew with that hole there?"
C: "No."
A: "Then how do you suppose the hole got there?"

From this beginning the adult might question why the hole was made and encourage examination of the interior of the shell to confirm suspicions that the nut "meat" might be missing. Much would have been lost if the answer to the first question was, "It's a walnut."

Don't be afraid to say "I don't know" to the children and to speculate with them on possible answers. Nobody knows all about natural history and ecology, which helps keep this study fresh and continually interesting.

THE INTERDEPENDENCE OF LIFE: THE RELATIONSHIP OF MAN, ANIMALS AND PLANTS TO EACH OTHER AND TO THE ENVIRONMENT

Orderly laws appear in nature. These laws seem to govern the distribution and success of living things. Do you think these laws apply to humans? to plants? to other animals? to all as a group of organisms living together?

What was the area like before man came here? What kinds of changes have occurred in the topography of the land, the soil, the plants, the animals? What has happened to the area since the appearance of man? What happens to organisms after man invades virgin territory to construct buildings and highways? Are there plant and animal species present that would not have been here if man did not alter this environment? Was man responsible for the introduction of new plants and animals and the extinction of once native organisms? What has happened to this biome since man has come and gone? What is a biome (community units, regions - examples, tundra, northern coniferous forest, temperate grassland, temperate deciduous forest, etc.)?

Relationships among different plants and animals are orderly. Is this relationship also true for man? Is man the only organism that can manipulate the environment? Can other organisms manipulate the environment? How? What are the relationships of abiotic factors such as light, moisture, temperature and nutrients to the plant communities, to the animal community, and to man? How do they all interrelate for the establishment of a habitat of good quality? What is the difference between abiotic substances (nonliving) and biotic substances (living)? List some examples of each. How do they affect each other?

What kinds of communities do we find in this ecosystem? What is a community? (Living part of an ecosystem, any assemblage of population.) What are the inter- and intrarelationships found in these communities? Are there any dominant communities in this ecosystem? What is an ecosystem? (Major units in which all living and nonliving factors of the environment are integrated. Example - land and water ecosystems.) What are the factors that allowed these plants and animals to dominate this particular region? What relationships do they impose on one another? on man?

During winter months, snow can be used to illustrate some of the abiotic factors that bring about changes and how these factors affect living things. What is its relationship to man? to plants? Is snow beneficial to living organisms? Is it destructive in any way? What is the snow's relationship to the water table and how does this relate to all living things?

Salt is used to melt the snow. Does this salt have any harmful effect on plants and animals? Does it have any effect on man? Any abiotic factor (such as - light, temperature, climatic conditions, weather, moisture, etc.) or biotic factor during any season can be used to demonstrate the relationships that exist in an environment.

A DOZEN CONCEPTS...
for Environmental Education

As you may have noticed, NATURE STUDY now is subtitled "A Journal for the Advancement of Environmental Education." It is our belief that environmental education should have certain concepts as its objectives. The following concepts should be considered as goals in the development of programs in indoor/outdoor education. No relative degree of importance is indicated by the order in which they are listed.

1. Man is able to damage and destroy the environment and its ability to sustain life. We possess enormous capacity for such destruction through machines and sources of energy only recently invented. We do not know the long-range impact of these activities on the natural environment - evidence indicates that many of our actions may have long-range bad effects.
2. Man is a product of the natural world, and is adapted to it. This adaptation is controlled and perpetuated by thousands of almost unchanging genes. This means that the world environment must be sustained essentially in its natural (i.e., precivilization) state or we, along with most other creatures, will succumb.
3. Man depends on the biological organisms with which he shares this planet for his own health and well-being.
4. Man is himself a biological organism, and his basic bodily needs are the same as for most other creatures.
5. The natural world is extremely complex. Like any complex organism or machine, there are many interacting parts and all parts are interdependent. All parts of the system must function properly or the whole system suffers. (The analogy with the human body, or with our community social structure, works well here.)
6. The proper functioning of one's body, or of the natural world (the ecosystem), depends on the fitness of the structures which make them up. This is easily seen in our own bodies, but may be hard to see in the ecosystem, where the functional parts are difficult to define and harder to analyze.
7. All things in nature must be cycled, so that they can be used over and over again. Some elements are cycled rapidly - carbon, water, oxygen, nitrogen. Others more slowly, through geologic processes- minerals deposited, uplifted, eroded. The materials of the earth are in limited quantities, and must be used again and again. Wastes of human activities must be salvaged and reused if future generations are to have the necessities of life.
8. Diversity is a necessity in the living world. The survival of any species will be in part dependent on the variations which it contains within itself. Man, in his ignorance or for selfish reasons, tends to simplify the world in which he lives, through monoculture of plants and animals, extinction of whole species, and destruction of specialized habitats (such as wetlands).

9. All living things have a right to exist in suitable habitats. Mankind's ability to change the face of the earth must be carefully exercised. Too drastic change is not only detrimental biologically, but may be indefensible morally.

10. Natural environments have important therapeutic effects on urbanized man, as witnessed in literature, art, music, reaction, wilderness, etc.

11. We must have within ourselves a sense of awe and wonder, a humility with regard to ourselves in relation with the natural world. Many of our problems of environmental deterioration are due to man's egotistical "above nature" attitudes.

12. We must translate ideas into feelings. People usually do what they feel like doing, not necessarily what they know they should do. The teacher must keep this fact ever in mind, so as to take advantage of those opportunities whereby students may develop attitudes friendly to nature and natural phenomena.

This editorial has been reproduced from the Summer 1969 issue of Nature Study and was written by John A. Gustafson.

ACTIVITY #1 Signs of Fall: Deciduous and Evergreen Trees

OBJECTIVES:

A student who has been on this field trip should be able to:

Mention ten different things which were observed.
Describe observations as to colors, shapes, and sizes.

THE TRIP:

Colors and leaves:

How many different colors can you find?
Which tree has the brightest yellow leaves?
Which tree has the brightest red leaves?
Which tree has leaves with the most colors?
What color are most leaves on the ground?
What happened to the green color of most of the leaves?
How many trees still have green leaves?
Do you think all of these leaves will turn from green to a different color? Why do you think this?
Will every tree lose its leaves?
Do any evergreens lose their leaves? Find some.
Do all the trees lose their leaves at the same time?
Why do you think this?
Which trees still have most of their leaves?

Pick up 6 or 7 different leaves:

Trace each leaf to the kind of tree it came from.
Did all of the leaves that you found come from trees in the same general area? How did they get there? Replace the leaves that were taken. Ask: "Why should you replace the leaves? Why not burn them?"

ACTIVITY #2 Signs of Fall - Woods

OBJECTIVES:

After completion of this activity, students should be able to:

Make comparisons between one season and another, illustrating what changes have taken place.
Predict probable change which may be expected to take place in the next season.
Discuss ways seasonal changes affect animals.

THE TRIP:

What sounds do you hear on a walk through the fields and forest in the fall? Would you hear the same sounds in all seasons? How would the sounds be different?

In what areas do you find the most leaves? Can you find any areas with no trees but with leaves on the ground? How did the leaves get there? Why do you think we find a relatively small amount of leaves on the crest of a hill?

Why are there leaves on some trees and not on others? What makes you think this? Do all leaves fall from trees at the same time? Do all leaves fall from trees? What would happen if none of the leaves fell to the ground? What might be some of the things that cause leaves to fall?

What species of trees change their leaf color first in the fall? What trees are late to change their leaf color? What trees don't change color at all?

Imagine how a bird would view the forest in the summer when flying over it. Then, imagine a bird's eye view of the same area during the fall when the leaves had fallen from the trees. How would the views be alike? different?

How will fall affect the animals living in this habitat? Do all animals remain in their area all year round? What makes you think this? Which animals do you think will stay? leave? What do you think will happen to the animals which do not remain? What makes you think this?

ACTIVITY #3 Fall & Winter Buds

OBJECTIVES:

Students should be able to:

Find next spring's buds on at least five trees.
Give a functional definition of bracts (bud scales) and leaves.

THE TRIP:

The green leaf is the food making part of the plant. Plants use some of the food they make to grow.

Can you find signs of this season?

Look at the tips of the branches.
What are the enlarged parts at the tips?
Will these buds open into leaves this season? Give reasons for your answer.
What will happen to these buds?
What will happen to this tree next spring?
When do the spring leaves form inside the bud?
What do trees need to make buds and leaves?
How do trees get their food?
What parts of the tree make food?
Are the leaves on the tree during the winter? early in the spring?
How could the leaves make food to grow buds if the leaves aren't there?
(Note: By careful questioning lead children to conclude that this spring's leaf buds must have formed last summer because that was when food was available.)
What is one function of the bracts (bud scales) which enclose the leaves?

ACTIVITY #5 Seed Dispersal: Field & Forest

OBJECTIVES:

At the completion of this field trip, the student should be able to do the following:

Name and describe several methods of seed dispersal.
Given different kinds of seeds common to the field trip area, match the seeds with the trees or other plants that produce them.

THE TRIP:

Look carefully into the air.
From what direction is the wind coming? How do you know?
Do you see anything being blown by the wind?
Do you see anything being carried from one place to another by the wind?
Are these things natural objects or man-made materials? If natural materials, are they animal or plant parts? How can you tell? Do you see any wind-borne seeds?

Walk through a field, along a hedgerow, or some similar area where "weeds" grow.
Examine your clothing. Is anything sticking to your clothing? What is it?
Look carefully with a hand lens at the seeds "sticking" to your clothes. How do they "stick"? Can you find the plants these seeds come from? Do they have seed pods? How do seeds leave the pod?
Can you find a seed that is, has been, or could be wind-borne? What is there about the seed that makes it possible for it to be carried by the wind?
How are these seeds dispersed? Is man the only animal disperser of these seeds? What other animals might do this?

Now that we've seen how seeds of small plants are dispersed, let's examine some tree seeds.
Look at the branches of trees.
Can you find any fruits, pods,nuts?
Examine the ground beneath the trees. What do you see, other than leaves, that might have fallen from the trees? Did you find any seeds or seed castings? Have any of these seeds started to grow? Have you found any tree seeds (such as acorns, beech burrs, hickory nuts, tulip tree seeds, or others) which are not under trees?
What means of dispersal do you think has occurred?

ACTIVITY #6 Woods in the Fall

MATERIALS NEEDED:

Pencil and paper

OBJECTIVES:

The student should be able to list changes that take place in a forest as the seasons change. The list of changes should include three things demonstrating the use of sight, three things demonstrating the use of hearing, two things demonstrating the use of smell and two things demonstrating the use of touch.

THE TRIP:

Find three things that are changing their appearance as fall approaches.

Feel the leaves and branches of trees and bushes. What words describe their feel? Do you think these things always feel and look this way? How have these things changed since spring and summer?

Does the forest smell the same in the fall as it did in the summer?
What smells can you identify?

What will happen to the leaves and trees in the winter?
What will happen to the leaves that fall to the ground? Can you find any of last year's leaves on the ground?
Is this surface matter helpful or harmful to the forest?
What would happen to the forest if man removed all surface matter each year?
What will the forest be like next spring? How will it look? Smell? feel? sound?

Make a list of things that have changed since the summer.
List three things you can see, three things you can hear, three things you can smell and three things you can feel.
Make a list of the colors you see in the forest. How do these colors differ from the colors in the spring? Will these colors continue to change? If so, how?

How will the change of seasons affect the animals which live in and depend upon the forest?

ACTIVITY#8 - WINTER COLOR

What colors do you think of when you think of the outdoors in winter? What color is the sky? the grass? the trees?

What colors do you see when you look around outdoors?
What color is the grass?
Is it all the same color? If not, what seems to make the difference? (NOTE: this investigation will be most effective if repeated on several occasions, including after a winter rain, and if investigations are made at the edges of melting snowfields.)
Is the grass dead? What makes you think this?

What colors are the fallen leaves on the ground? Are all leaves of one kind the same color?
Try to make up names to describe the colors of the leaves and grass. Can you find one the color of sandpaper? of hot cocoa with and without a marshmallow?
Are the leaves dead? What makes you think this?

What colors are the leaves that are still on plants?
Are these leaves dead? How can you tell if a leaf on a plant is dead or not? How do the colors compare with those of the leaves on the ground?

What colors are the branches of trees and shrubs? Can you find a branch that was last summer's growth? Is it any different in color from the older bark? When do you suppose the change in color takes place? What causes the change?

Do you think the branches are dead? Why or why not? What will become of the buds?

What colors are buds on trees and shrubs? (Examine closely any dogwood buds you can find). How would you describe the colors you find on buds and branches?

Look at trees in the distance. What colors do you see?
Can you find trees near-by which you think are the same kind as those in the distance? How did color help you? How many different kinds of trees can you pick out in the distance?

What color is the sky?
Is it the same color all over? Look close to the horizon. Is the sky lighter or darker close to the horizon than overhead? What colors are the clouds? What parts of a cloud are darkest? lightest?

What color is the snow?
What color are shadows on snow?

What color is the ground?

What colors do you see in the water of a pond or stream?
Are these colors in the water? in things in the water? Are they reflections?

What colors are the tree trunks?

What colors do you see on birds?
Are the light colors mostly on the underside or topside? How do the colors of birds and other animals compare with the other colors you see outdoors at this time of year? Are these birds around here all year? Will their colors be the same all year?*

What colors are the berries that are still on shrubs?
Why do you suppose the berries are the brightest part of many plants in winter? (Compare with flower colors. Why are flowers the most colorful parts of plants in summer?)

What color is ice?
Look for ice in places other than on ponds or streams. What color is an icicle? Is it all transparent? Is it translucent? Is all the ice on a pond or stream the same color? What seems to make differences in color?

*NOTE: Some winter residents, such as the junco - sometimes called "snow bird" because its colors blend so well with the black, white and grey winter landscape - migrate north in spring. Others, such as the goldfinch, change from the drab winter browns to brighter summer hues.

Vocabulary: transparent - can be seen through
translucent - lets light through

ACTIVITY #9 - WINTER OUTDOORS

OBJECTIVES:

Children should be able, verbally, to describe a field trip and rules for behavior during a field trip.
Children should be able to name the seasons of the year and describe characteristics of the season, verbally, in pictures, in stories.
Children should be able to name three or four sounds heard outside in winter; name colors seen in winter.
Children should be able, by deduction, to identify winter food and homes of birds and animals.
Children should be able to name two or three animals and birds they see, or might see, in winter and give reason why others are not seen.
Children should be able to identify tracks, as such, not necessarily by name of bird or animal, and be able to identify droppings as such.
Children should be able to describe snow as to color and touch and tell where snow comes from and when snow falls in this environment.
Children should be able to define verbally and pictorally what hibernation and migration mean.
Children should be able to identify food sources of birds and animals in winter.
Children should be able to name two characteristics of a creek or stream.
Children should evidence a concept of vocabulary by

a. answering knowledgeably to questions
b. using the word as a normal part of their vocabularies
c. drawing pictures of words or ideas
d. writing a story or dictating a story describing concepts, specimen, season, insect, bird, animal, seeds, nuts, cones, rocks, roots, trunk, branch, twig, bud, seed pod, creek, stream, pond, bare, heat, snow, bush, tree, nest, track, field, forest, food supply, running water, ice, fresh, droppings, park, fur, feathers, hole, feet, beak, pads, hooves, claws, nails, front, hind, tail, fly, soar, flapping, slide, melt, bark, shelter, woods, wooded areas.

THE TRIP

How many seasons of the year are there where we live?
What season is it now?
Look around. Can you tell some things you see or feel today that you cannot see or feel in summer? Today let's look for winter.

Look down. Is winter there? Look up. What does winter look like? Look to the right, to the left. Is winter everywhere? What color is winter? Close your eyes; listen. What are the winter sounds? What don't you hear that you might hear in summer?
Take a deep breath; does winter air feel and taste the same as summer air?

TREES

Do all the trees look the same now as in summer? Where are the leaves that were on the trees?
Are all of the trees bare? Do you see anything on the trees that are not leaves? What shapes are the things on the tree? What are they? Why are they there?
Can you find something on the ground that looks like the seed on the tree?
Put your arms around the trunk of a tree. What shape is the trunk of a tree? Feel the bark. Do you think all bark is alike on every tree?

How can you tell one tree from another?
What do you call the arm-like things growing out of the tree? (branches)
Is anything growing out of the branches? (twigs)
Is anything growing on the tree other than twigs and branches?
What holds the tree in the ground?
Is a tree alive? Then what do all living things need?
How does a tree get the food and water it needs to live?
Do trees get sick like you do?
How many things can you name that might make a home in a tree?
What signs might we look for that a bird or animal uses a tree as home?
Can you find anything that shows that trees and plants are preparing for spring? Will there be leaves on these bare trees when spring comes? Where do leaves come from? Let's look for buds. Have you ever watched a bud open? Will you remember to remind us to watch for opening buds as spring comes?

Now let's see. We know that trees have roots, a trunk, branches and twigs. The outside of the tree is covered with bark. Leaves and seeds or nuts grow on trees. We can tell trees by the difference in color, bark, size, shape, leaves and seeds. Now detectives, you said all the leaves fall off and that birds, animals and insects make homes in trees. Can anyone discover a tree that still has leaves on it? Who can discover something on the tree that is not a bird, animal or insect? (moss, algae, fungi)

Do you see any fallen trees on the ground? Did they all fall in the same direction? Why? Did the roots pull out of the ground? Are there more fallen trees in one area than in other areas?

What might make a large tree fall down?
If no one touches the tree on the ground and you ome back when you are grown up, do you think it will look the same then as it does now?

FIELD

Do you see any birds or animals in the field?
What grows in the field? Are all the plants alike? the same size and color? same shape? Are the plants alive or dead? What color do you think they will be in spring and summer?
Is there food for birds and animals in fields?
Do you think any animals would make their homes in fields?
Why don't you see many trees in the field?
If we could dig up some earth in the field what do you think we would find?
Are there as many leaves in the field as there are in the forest? Why not? How did the leaves get here that are on the ground?
Would it be easier for animals to see and be seen in the field or wooded areas?
If you were going to build a house would you build it in the field or woods? Why? If you were out in the fields and woods alone, would you be able to find food and shelter?

ANIMALS

Do you think we can find any birds or animals today?
Will we see as many as we might see in summer?
Can you name some animals that might live here?
If we don't see any animals, how could we discover if anything has been here?
(tracks, droppings) Are the tracks alike? How are they different?
Do animals have to eat in winter? Then where would be the best place to look for animals or signs of animals?
Do you think we might find tracks near the edge of water? Why?
How do animals prepare for winter?
Do you sleep some part of every day? Do animals sleep too?
Does anyone know what hibernation means? Do you hibernate? Why do some animals hibernate?
Would you expect to see more animals when you walk in a small group, alone, or with a large group? Why?
Do you think we would see any baby animals in the winter?
When do most animals give birth to their young? When could you expect to see babies?
Sometimes an animal can be close to us but we don't see it. Why?
How do animals behave when they are afraid?
Do any of the trees or branches look as if they have been chewed? Are the marks high or low on the tree? What does that tell you about the size of the animal?

INSECTS

Could you get stung by a bee today or see a fly?
Where are the insects in winter?
Where do you think we could find some?

BIRDS

Will we see and hear as many birds today as we will hear in spring and summer?
Some birds leave their homes in the fall. Where do they go?
Why do they go? What is their trip called? When do these birds come back?
How can we tell if there are birds here?
Do all birds look alike? Do they sound alike?
Where would we find winter homes of birds?
Do birds have to eat in winter? What do they eat? Then where is the best place to look for birds?
How many legs does a bird have? What enables a bird to fly?
Put your arms out and pretend they are wings. Flap your wings. Now glide and soar.
What does a bird have on the outside of its body?
What happens when you get near a bird? Listen to the songs of the birds.
Do the sounds change as we approach? Why do birds fly away when they hear a noise?
What might we see on the ground that could tell us the type of bird that has been here before us? (tracks, droppings, nest)

CREEK AND POND

Do you see any running water? What do we mean when we say "running water"? Does water have legs? What do you call this kind of water? (creek, stream, pond)
What kind of noise is the creek making today? Is it quiet or "laughing"?
What do you see on the bottom of the stream?
Where are all the animals now that you can find in the creek in summer?
Is the stream clear or muddy?
Is it full or shallow? Why is it full or shallow? Where does the water come from that fills the stream or pond?
When the water hits the stones and rocks on the bottom, what happens? Is the water frozen? Why or why not?
How is a stream different from a pond?
Can animals live under the water when it is winter?
Does the ground feel the same under your feet near the edge of the pond or stream?
Where does this water go?

FOOD

If you were a bird or animal and you were hungry, where would you look for food?
Why are some nuts and berries still on the trees and bushes?
Can you find a nut on the ground? Is there anything in it?
Can you find any seed or nuts that have been opened?
Who opened them?
What do you call the outside of a nut?
Do you like some foods better than others? Do you think all birds and animals like the same food?
What do you suppose would happen if all animals and birds ate the same food?
Could you find a bird or animal more easily if you knew the type of food it liked to eat?

IF THERE'S SNOW

How would you describe snow to someone who has never seen it?
Where does snow come from?
What is snow? (Condensed water vapor in clouds is exposed to freezing temperatures and becomes snow. Air is held between snow crystals within angles and acts as insulation.)
What happens to snow when you hold it in your hand?
How can you tell when something has walked on the snow? Do all tracks look alike? Describe any tracks you find. Look at your own tracks; do they look like animal or bird tracks? What do you have on your feet that would change the track made by you in winter and the one made by you going barefoot in the summer?
Why do tracks change in the snow?
Is the snow level wherever you look?
Where is the snow deepest? Why?
Why are some areas bare and some places piled high with snow?
How do birds and animals find food when there is snow on the ground?
Is food easy to see when there is snow on the ground?
Is there snow on the trees?
Describe the sound your feet make when you walk on snow.
Is the snow hard or soft on top? Is this new snow or has it been on the ground for awhile?
Do you see any signs of snow melting?
Will you be able to see tracks better in fresh snow or "old" snow?
Do you see any green plants? Look carefully; what is happening to the snow around each plant? (small melting circle) What melts snow?
Then do plants give off heat?
Where would you look for animals today? Where would be a good place for animals to stay?
What helps keep animals warm in winter?

ACTIVITY #10 - OBSERVING BIRDS AT A FEEDER

OBJECTIVES:

Children should be able to describe verbally birds as to general color, size, shape, and shape of beaks, legs, feet, color under tail feathers, wing bars, eye rings, voice, action.

Children should be able to identify bird on bird chart after observation.

Children should be able to name the number of toes and describe the toe position when bird is standing.

Children should be able to describe the difference between the male and female of the same family.

OBSERVATIONS:

1. Watch birds at a feeder.
2. What is the color of the bird? Is it big or little?
3. What is the color and shape of the beak?
4. Look at the legs and feet. Are the legs long or short compared to the body? What color are the legs? How many toes does the bird have?
5. What makes this bird different from other birds at the feeder?
6. How are the birds alike?
7. Look for special markings on the head, back, top and bottom of tail feathers.
8. Does the bird pick up the food and fly away? Does it eat the food at the feeder? How does it open the seed?
9. If there is a variety of food, does every bird eat the same food or do some seem to prefer one type of food to another?
10. Why is suet hung on feeders?
11. If people do not feed birds in winter, how and where do they get the food necessary to survive?
12. Do birds need water as well as food? Where do they get water in winter?

ACTIVITIES:

1. Go to bird chart, review characteristics of bird (s) watched, and identify the bird seen by name.
2. (Classroom) Write an experience chart. Using the child's name before his or her sentence heightens interest. Example: John said, "Our class took a trip." or Mary said, "We watched birds feeding at a bird feeder."
3. Keep a large class record on bulletin board. Name of bird - where we saw the bird - date we saw the bird - time we saw the bird - what the bird ate - picture of the bird - special characteristics.
4. Children can make a book about birds, drawing pictures and noting details in the picture - color, seen in the air, tree, ground, feeder, etc.
5. Teacher can make enlarged outlines of beaks, body, feet and have children match pieces and identify the bird by name.
6. Place pictures of birds on bulletin board. Fold a large piece of paper in half, paste picture on underside with name of bird on top of card. Have child read the name, lift to see if he is correct. Reverse card, have bird picture on top, name the bird, raise to see if answer is correct.
7. Make a blank scene with ground, tree, sky. Have children fill in pictures of bird seen, where seen, when seen, observer's name.
8. Make up a song or poem about birds seen.
9. Make up riddles and ask class members to answer by holding up cards with bird name on it. Example: I am a small bird with a black cap. Who am I?
10. Make an alphabet book of birds (good for animals and plants too).
11. Make bird feeders in the room for school or home use.
12. Collect natural food for feeders and note which food is eaten by what bird.

ACTIVITY #12 Signs of Spring

OBJECTIVES:

Children should be able to name the seasons of the year and describe characteristics of the season, verbally, in pictures, in stories.
Children should be able to name three or four sounds heard in the spring and name colors seen in spring.
Children should be able, by deduction, to identify spring food and homes of birds and animals.
Children should be able to name two or three animals and birds they see, or might see, in spring.
Children should be able to identify tracks, as such, not necessarily by name of bird or animal, and be able to identify droppings as such.

Children should be able to identify food sources of birds and animals in spring.
Children should be able to name two characteristics of a stream.
Children should evidence a concept of vocabulary by

a. answering knowledgeably to questions
b. using the word as a normal part of their vocabularies
c. drawing pictures of words or ideas
d. writing a story or dictating a story using: specimen, season, insect, bird, animal, seeds, nuts, cones, rocks, roots, trunk, branch, twig, bud, seed pod, creek, stream, bare, heat, snow, bush, tree, nest, track, field, forest, food supply, running water, ice, fresh, droppings, park, fur, feathers, hole, feet, beak, pads, hooves, claws, nails, front, hind, tail, droppings, fly, soar, flapping, glide, melt, bark, shelter, woods, wooded area.

Children should be able to name animals they might see in spring and animals they would not see and explain why.

THE TRIP

TREES

Something very different has happened to this area since winter. Look at the trees. What do you see now that we did not see in winter? What colors do you see now? Are all the new leaves the same color? Where did the leaves come from?
Do all of the trees have new growth?
How do trees "know" it is spring and time to wear their leaves and flowers? Do they have clocks inside or a thermometer? Why do you suppose we see the grass getting green and new growth on bushes and trees in spring?
Do you think the tree is larger now than it was last spring?

Do you see any branches that do not have leaves or buds growing? branches that are still bare?
What do you suppose happened to them?
Can you find anything on the branches that is not a leaf?
Now, do you suppose you could find three trees with different types of bark? different leaf growth? different flowers or seeds?

ANIMALS

Do you think we might see some animals today? Would this be a good time of the year to see baby animals? What animals live here? Could we discover any signs of animals even if we don't see the animals themselves? Pretend we are quiet Indians tracking animals. What would you look for? Where would you look? If we got close to a nest where a mother had some babies, what do you think the mother might do?
Do you think you would find more animals under the ground? near trees? in trees? in the open fields? near water? How would an animal feel if it heard many feet and voices getting near its nest? What do you do when you are frightened? Where would be a good place to look for animal signs?

BIRDS

Stop; close your eyes; listen! Pretend you are a stone statue and the only thing you have are two ears that hear. Open your eyes. What made the sounds you heard?
Do you hear more birds now than we heard in winter? Why? What is migration? What bird is one of the first to return to our area in spring?
Now you are a statue again. This time you can hear, see and turn. Can you see any birds? If you see one, tell us where it is, what color it is, what size it is, and what it is doing. Do you see a nest? What might be in the nest in the spring time? What do birds eat? How do baby birds eat after they come out of the egg? Can baby birds fly when they are born? How would a mother bird react if you went near her nest?
Do all birds sing the same song? If we cannot see a bird, could the bird be identified by its call?

INSECTS

If you were here in the winter, you probably didn't see any insects. Where were they? Could you see some now? Why? You may have hitch-hikers on you when our trip is over (ticks). If you find an insect, look at its color, shape, location, size, and count its legs.
Did you know there are more insects in the world than any other kind of animal life? Why do you suppose there are more insects in our woods than any other animals or birds?
Are insects large or small? Do they eat animals or plants?
Are they food for anything else?
Where would be some good places to look for insects? Why?

ACTIVITY #13 Signs of Spring: Spring Green

OBJECTIVES:

While on the trip, students should be able to pick out three leaves with differing shades of green and three leaves with differing textures.

Children should be able to describe leaves in terms of color, texture, and possibly odor.

Children should be able to write a description of spring, involving observations made using their senses.

Following the trip, children should demonstrate an increased awareness of variations within colors by comparing the colors in their clothes and in their environment.

THE TRIP:

See something green!
What color do you think of when you think of spring? Are all greens the same? Try to describe any differences you see. Do different plants have the same kind of green? Can you find more than one kind of green on one plant? Do some plants have different degrees of green on the upper and undersides of their leaves? Are the leaves or buds the only parts of the plants that are green?

Are all buds green? When you look up toward the sky, do all the trees look green at the top? Describe some of the differences. Do you see any buds that are brown? Do you see any buds that are red? orange? Can you find, closer to eye level, any opening buds with a brownish or reddish color? What part of the bud is that color?

Do all plants become green at the same time? Look at the tops of the trees, the shrub layer, the ground layer. Have any plants already bloomed? What makes you think so? Are some plants in bloom now? Can you find flower buds on some plants? Do some plants seem to be coming up just now? Do you think all of these plants started getting green at the same time? Why or why not?

Can you find any leaves on the ground? Are they green? Were they once green? What makes you think so? When? How do they feel? Feel some green leaves and describe how the green ones feel compared with the brown ones.

Feel something green! Rub the surfaces of some of the leaves. Try to describe how several feel. Can you find leaves that feel smooth, sticky, fuzzy, bumpy, glassy, waxy? Does the undersurface feel like the upper surface? Does the leaf feel the same when you rub your fingers along the leaf from the tip to the stem as when you rub your fingers across the leaf from one side to the other? Do you see anything on the leaf that makes it feel the way it does? Look at the leaf after you rub it. Is it the same shade it was? How do your fingers feel?

Hear something green! Rub your fingers along and across some of the leaves again. Do you hear anything? Try to describe the sound. How is what you hear explained by what you feel and see? How does a handful of green leaves sound compared with a handful of brown leaves?

Smell something green! How would you describe the smell of the leaves on the ground? Do the new leaves smell like this? Can you find leaves with different smells?

ACTIVITY #15 Signs of Spring or Fall

OBJECTIVES:

Students should be able to relate five observations (involving at least three of their senses) that are "signs" of the season.

THE TRIP:

How can we observe signs of fall? spring? Can we feel fall? spring? What feelings do you notice? (Sun, wind, rain, warmth, etc.) Are these different now than they were last season?

Try feeling various items at hand - trees, rocks, water, grass, weeds, rose bush, earth, etc. Can you feel differences between them? (Describe them.)

Can we smell fall? spring? Do you smell anything now? (Try smelling flowers, garlic, skunk cabbage, damp earth, etc.) Can you find anything nearby that has an odor? Are these odors different? Can you describe the odors?

Can we hear fall? spring? Be very quiet and listen. (You might make a list of what you hear.) Which of the sounds that you hear would you probably not have heard last season? Where do sounds come from? Which sounds are man-made? Which are from birds, insects, frogs, other animals? Which are made by non-living things? Try to describe what some of the sounds say in your words. (Birds might be easiest to start with.) Try to imitate some of the sounds. How do sounds differ in quality?

Can we see fall? spring? What colors can you see? How do they differ from the colors of other seasons? (Or the colors of two or three months ago?) Is the grass all green; all the same color of green? Is the sky blue? What colors do you see in flowers? in trees? What color is sunshine? What color is rain? What color are clouds?

What shapes can you see? Are all trees shaped the same? What shape is a leaf? Draw some leaf outlines. What shape is a flower? What shape is a cloud? Can you find a triangle, a rectangle, a square, a circle, etc. in any of these?

What sizes can you see? What are some things you can see starting with the biggest thing and getting smaller until you reach the smallest thing you can find? What things can you see that can be both big and little?

What patterns can you see? Can you find a tree that looks like something else? Can you see patterns in clouds, rocks, grass, water, etc.? Can you see patterns in plants, birds, insects and other animals?

How do you know it's Spring
and how do you know it's Fall?
Suppose your eyes were always shut
and you couldn't see at all.
Could you smell and hear the Spring
And could you feel the Fall?

Margaret Wise Brown

ACTIVITY #16 Tree Buds

MATERIALS NEEDED:

Pencils

OBJECTIVES:

While on the trip, students should be able to:

- Find at least three buds which open with leaves in different "packaging" arrangements.
- Count the number of leaves emerging from one bud and make comparisons with buds of same and different species.
- Differentiate new growth from old on evergreens.
- Locate at least one plant which has bloomed, one which is in bloom, and one which has not yet bloomed.

Given a variety of trees which "leaf-out" at differing times, students should be able to distinguish the ones which leaf early from the ones which leaf late and to realize that not all trees bloom or produce leaves at the same time.

In the weeks following the trip, students should:

- Demonstrate a continued interest in opening buds by observing and bringing in examples of leaf buds which unfold in ways similar to or different from those observed on the trip, and/or by bringing in branches for class observation.
- On their own initiative, carry out some of the follow-up activities suggested. (See Follow-up Master Key Index)

THE TRIP:

Do all buds open at the same time? Examine a variety of trees before coming to a conclusion.
Can you find some trees and shrubs whose leaves seem to be completely unfurled before other trees have begun to open? Do all trees of a given type leaf-out at the same time? Do all the buds on one tree open at the same time?

Are leaves full-sized when they emerge?
Are all leaves on a given tree the same size?

Observe the orientation of the leaves as they emerge. Do they "hang down"? Are they "held up"? Are they "thrust out"? Try to use descriptive phrases in telling about them, such as "rabbit ears", "a handful of playing cards", etc. Try to sketch some of these arrangements.

How have the leaves been packaged in the bud?
Find a tree whose leaf emerges folded in half. (Tulip tree)
Are both sides of such leaves exactly alike?
Find a tree whose leaf emerges accordian pleated. (Beech) Is there any relationship between this and the veining pattern?
Find a tree whose leaf emerges curled. (Willow)

How many leaves come out of one bud? Is the number the same for all buds on a given tree? for all trees of a given type?

Observe the bud scales from which the leaves are emerging. What color are they? How does their texture compare with the texture of the leaves on that tree? Compare the bud scales on different trees.
What becomes of the bracts after the leaves unfurl?
Compare flower buds and leaf buds.
Which open first on dogwood? maple? etc.
Do the leaves and flowers come from the same buds?

Let's find an evergreen tree. What are the leaves on an evergreen? Can you find buds on this tree? Where are last year's leaves? Is any part of each branch a different shade of green? What part?
Where would you expect to find buds on a branch?
Feel the light green tips. How do they feel? How do they feel in comparison with the darker needles? What might explain the difference?
How does an evergreen grow?
Are there any other kinds of "buds" on these trees?
What do you suppose they are? Why?

ACTIVITY #17 Bird Homes

OBJECTIVES:

Children should be able to:

Sit in one place for fifteen minutes making observations.
Differentiate between an observation and an inference.

Following the trip, children should want to:

Build, as a family, or class-group project, a bird house. Tell about the birds they have seen in their yards on the way to and from school, or on the school grounds. Provide food and nesting sites for birds at school and at home.

THE TRIP:

Seat class near enough to a bird house to observe activities.

What are the birds doing? Are they carrying anything to the house? What? Are they carrying anything from the house? What does it appear to be? Where do the birds go when they leave the house? Do you think they are building a nest? Why do you think so? Do you think there are eggs in the nest? What makes you think so? Do you think there are baby birds in the nest? What do you see and/or hear that makes you think this? What color is the bird? Do all the birds you see going to the nest look alike? Can you tell which is the male or female? How can you be sure there is both a "father and mother" bird coming to the nest? How many birds are going to the nest? How can you tell? What do these birds eat?

Listen for the bird's call or song. Can you describe it? Can you put it into words? Does the bird sing like the robin or cardinal or mockingbird or like some other bird you know?

Is there anything about the way it flies that would help you recognize it?

How does this bird compare in size with the other birds you see around here? a sparrow? a robin? a crow?

Watch as the bird perches. Does he perch on a twig? The trunk of a tree?

Watch for him to land on the ground. Does he hop? run like a robin? waddle?

In what kind of area did you find the nests? Would you expect to find this kind of bird at your school or nesting in your backyard? Why or why not?

ACTIVITY #19 Flowers

MATERIALS NEEDED:

Flower field guide very helpful.

OBJECTIVES:

After completion of this exercise, the children should be able to:

Make a list of colors and shades of colors found in plants.
Recognize and identify five different flowers.
Draw five different generalized leaf shapes.
Give a functional definition of a flower.

THE TRIP:

How do you know it's Spring?
And how do you know it's Fall?
Suppose your eyes were always shut
And you couldn't see at all.
Could you smell and hear the Spring?
And could you feel the Fall?

Margaret Wise Brown

Walk along the trail and look around you. How many different colors do you see? Name them. Is all the green the same? If not, how does it differ?

What different kinds of flowers can you see from where you stand? (You don't need to name them; just describe them.) How can you tell that those at a distance are flowers? Do some flowers grow on trees, or are they all on smaller plants? Can you find any plants that have no flowers?

Find some flowers and take a close look at them. Are they the same color all over? How do they vary? What shape are they?

Apply the same questions to other flowers nearby.

Are flowers all regular in shape or are they irregular? Do they all have the same number of petals?(Make a list of various numbers.) What different shapes are the petals? (Draw some of their outlines.)

Look at the leaves. Are they all the same color? shape?
Draw some leaf outlines of different kinds.

Can you find some flowering trees? (Not all trees have obvious flowers.) See if you can see how some of the flowers might develop into fruits. (Red maple, apple.) Can you find a green flower? (Grass, spice bush, sedge.)

Look for mayapple plants. Do they have a flower? What color is it? Which ones have the flower? Is this always true? Count the leaflets. Does each have the same number? Make a list of different numbers. Is there a number which predominates?

Do all the flowers you have examined have petals?

Do all plants have flowers?

Discuss the function of flowers, bearing in mind this will need more than the present observation.

ACTIVITY #21 Buds on Trees

MATERIALS NEEDED:

Hand lenses, tweezers, knife, paper, pencils.

OBJECTIVES:

Students should learn to use tree buds to help identify trees. Students should begin to discriminate between leaf and flower buds.

THE TRIP:

Can the leaf buds be distinguished from the flower buds? (Usually you can't tell these buds apart by just looking at them. Cutting such buds open lengthwise, the leaf bud will have a number of small undeveloped leaves. The flower bud contains one or more miniature or undeveloped flowers but no foliage leaves. In some cases mixed buds (apple, lilac) containing both leaf and flower structures will be found.)

What purpose does the bud scale have? New leaves and/or flowers enclosed in buds are usually protected by several layers of overlapping scales, called bud scales, which are really modified leaves. Bud scales are maybe covered with hair (willow) or a waxy secretion (cottonwood). (They protect the enclosed structure from drying out and from injury.)

When are buds formed? (They begin to form during the summer of the preceding year. They are called winter buds because they live through that part of the year.)

Observe the position or location of the buds on the twig. Some buds form on the ends of the stem (terminal buds) and some develop along the sides of the stem above leaf scars (axillary buds). Adventitious buds form anywhere on the stem except at the tip and above the leaf scars.

Variations among buds can be observed by looking for characteristics such as:

1. Shape
2. Number of scales
3. Presence or absence of hairs

What size are the buds? Are all the buds the same size? Can you find buds of different sizes on the same tree?

What color is the bud? Is all of the bud the same color?

What shape are the terminal buds? Compare the terminal buds with the lateral buds in size and shape.

Use the hand lens to observe the bud scales closely. Describe what you see. (Perhaps the margins of the bud scales will be covered with fine hairs.)

Can you count the scales on the terminal bud? Describe the scales.

How are the buds arranged on the twig? (In bunches, opposite each other, alternating?)

Note: It is best to have students bring buds and twigs from home to avoid wholesale defoliation of a study area. Many areas have a "no picking" rule for this reason.

Students could also "force" buds to watch them develop. Ask students to bring several small twigs to school. Maple, lilac, and forsythia are especially good. Put the twigs into containers of water and the class will be able to see the twigs bloom indoors.

ACTIVITY #35 Leaves: Writing a Cinquain

MATERIALS NEEDED:

One notebook or old workbook for each child; drawing paper; crayons.

OBJECTIVES:

Children should be able to:

Find three leaves of different shapes, sizes and colors.
Make a crayon "rubbing" of the leaves.
Write a five line poem (cinquain).

THE TRIP:

Choose three of the fallen leaves from the ground. Find leaves that are different sizes. Use the top of a notebook to arrange the three leaves. Place a piece of white paper over the leaves. Each child should have three crayons. Use the crayons by rubbing them (holding them lengthwise flat against the paper) across the paper. Overlapping of colors gives an interesting effect. As a result the child will get the outline of the leaves in color on white paper.

How have the leaves changed since summer?
What colors are they now? What colors were they then?
How do they feel?
Why are the leaves found on the ground?
Are the three leaves you found the same shape and color?
How are they different?
Did everybody find the same three kinds of leaves?
Find three leaves with different shapes. Make crayon rubbings of them.
Find three leaves of different colors. Which crayon most nearly matches the color of each leaf?

ACTIVITY #22 Fungus on Log

OBJECTIVES:

When asked to give some words describing an object in nature, the student should include in that list adjectives that demonstrate the use of the senses: sight, smell, touch and hearing.

THE TRIP:

Draw attention to fungal growth on a fallen tree.

What color is it? Is it wet or dry? hard or soft? Does it look the same on all sides of the tree? Does the top side of the growth look the same as the bottom side?

Feel the growth. Is it rough or smooth? Does the growth feel the way it looks? Does it feel the way you thought it would feel?

Pull a small piece of the growth from the tree. Squeeze it. What happens when you squeeze it? What happens when you release it?

How does the growth smell? (NOTE: Caution your students about breathing in spores if the fungi has matured.) Try to describe it. Do you know of anything that has a similar smell?

Have you ever seen anything else that looks like this growth? Feels like it?
Is the log alive? Do you see any other trees nearby with the same type of growth? Are they alive?

ACTIVITY #23 Spore-Bearing Plants

MATERIALS NEEDED:

Hand lens, identification keys.

OBJECTIVES:

After the completion of this trip, the student should be able to do the following:

Name at least three observed differences between seed-producing plants and spore-producing plants.
Identify, from pictures or specimens, mosses, ferns and fungi.

THE TRIP:

Ferns:

Observe the ferns that you find.
Do you see flowers or fern plants?
Do you see fruits or seeds on these plants?
Describe both sides of the fern leaves. What is the difference between the two sides? Make a diagram and describe any differences.
Compare the fern leaves with leaves of other plants in the area that are not ferns. List specific differences.
How large do you think these ferns will grow? What makes you think this? Through observation, can you find many ferns that give you some idea of the size of most ferns at maturity?

Mosses:

Observe mosses in the woods.
What color are the mosses that you have found?
Do you see fruits or seeds on the mosses?
Examine the mosses with a hand lens. Do you see leaves?

Do you see stalks? Do you see stems? Do you see flowers or flower parts?
Do the mosses have roots?
Feel the mosses. Describe how they feel.
Have you ever seen flowering mosses?
Do mosses have seeds? How do you think they reproduce?

Fungi:

Observe any fungi that you may find.
Where have you found fungi growing? Describe the soil or other materials where you find fungi growing.
Are there flowers, fruits, and seeds on the fungi?
What colors are the fungi?
Are the fungi the same color as the mosses and ferns?
Look at the bottom side of any mushrooms or toadstools that you have found. What do you see?
In what ways have you found the ferns, mosses and fungi to be alike? In what ways are they different?

ACTIVITY #24 Decomposers

OBJECTIVES:

Students should be able to:

Differentiate between living and decomposing wood.
Find examples of decomposition in their yards and near the school.
Demonstrate an awareness of the importance of the decomposers by such means as encouraging the use of a compost pile in home gardening.

THE TRIP:

Do you think these trees are dead? Why?
What is the difference between a dead tree and a living one?
What will become of these trees? Suppose they are not taken away from here?

Is the bark still on all the logs?
What is under the bark?
Tap on the bark. How does it sound? How does this compare with the sound of the living trees?
Feel the bark and the wood under it.
How would you describe it?
Does it feel the way it looks?
Does all the wood under the bark look the same? Feel the same?
Push and poke it. Can you find some that is fibrous? spongy? powdery?
What other words can you use to describe the way it feels?
Is there anything on these tree trunks and logs besides bark?
Is this material living or dead? Why do you think so?
What color are fungi? (NOTE: Although white or grey will probably be the answer, suggest they look more closely for other colors with such questions as: Are they all the same shade of white? grey? Can you find fungi that are striped? brown? orange or reddish black? cream colored? some other color?)
How would you describe the appearance of fungi? Can you find fungi that are: semi-circular, flat, or needle-like?
Are all the fungi living? Why do you think this?
Can you find fungi that look like open umbrellas? closed umbrellas? a deer's antlers? What other ways could you describe them?
From looking at them, how do you think fungi feel?
How do they really feel?
How many different textures can you find? Can you find fungi that feel velvety? leathery? granular? like paper?
What other words can you use to describe them?

Can you find signs of other organisms that are or have been in these logs? What signs?
What do you think made the holes? marks?
Does the animal which made the hole seem to be there now?
What makes you think this?
What part might this animal have played or be playing in the death and/or decomposition of this log?
On what observations, if any, are you basing your answer?
Might there be some other explanation? How could you find out?

Have all these logs been lying here the same length of time?
What makes you think this? Find the one you think has been here the longest. Where does the log stop and the forest floor begin?

Should we "clean" these woods and remove these logs?
Why do you think this?

Is there any other place in this forest where decomposition is taking place? How about in the field? in your yard and garden? What would the world be like without the decomposers?

ACTIVITY #29 Flower Function

MATERIALS NEEDED:

Hand lens, identification keys.

OBJECTIVES:

This field trip should contribute toward the student's understanding of the events that occur during the spring which lead to seed dispersal in the fall. The student should be able to:

Identify and differentiate between the buds of leaves and of flowers.
Name and describe two methods of pollination of flowers.
Identify the major parts of a flower that function in reproduction.

THE TRIP:

At the field and woods

Observation by sight and touch and smell.

Smell the air of the woods and field. Describe the odors.
Note, from a distance, the colors and abundance of leaves.
Look at the branches of trees and the stems of other plants.
Locate the leaves. Locate the buds if any.
Locate flowers on trees and other plants.

Smell the leaves and flowers of the same tree (or other plant). Do they have the same odor? Which do you think has the more pleasant odor, leaves or flowers? Do you think everyone would agree with you?

Look for plants that have buds but no flowers. Look for plants that have buds partially opened and/or fully opened.

Look for a leaf bud and a flower bud on a tree. Try to find the tiny leaves in a leaf bud. Describe them. Describe the differences between the two.

In the field, look for insects close to or in flowers. What insects do you see? Are they flying or crawling? Do they go to flowers of the same variety or of different varieties? Smell the flowers. Are the odors pleasing to you? Do you think it is the odor or some other factor that attracts the insects?

What part do these insects play in the story of seeds and their dispersal? Can you suggest other possibilities for pollination of flowers?

Can you predict the fall appearance of the plants you have observed?

ACTIVITY #31 Stems and Budding

OBJECTIVES:

Given several tree branches, the student will be able to separate the branches with opposite buds from those with alternate buds.

Given descriptions of the buds, flowers, leaves, and bark of various trees, and a branch of each, the student will be able to match five branches to the correct description.

THE TRIP:

Have each member of the class examine five trees to determine the arrangement of buds on the branches. How many trees have buds which are opposite? How many alternate? Compare the bud arrangement with the branching system. Do the trees with opposite buds have opposite branching? Describe each kind of bark in terms of color and texture.

If the buds have not opened, examine them and compare them for size, shape, color. Describe them. Can you find some shaped like an onion? What other descriptive terms can you use?

If the buds have opened, describe the leaves or flowers. Be sure to mention texture and odor.

Describe each of the pre-selected five trees as to leaves, bud arrangement, flowers (if present), and bark characteristics. This can be done in the format of "I'm thinking of the tree whic has_____. Which one is it?

ACTIVITY #33 Trees: Color, Shape, Texture

OBJECTIVES:

During this field activity, children should be able to:

Observe tree parts and note colors, shapes and textures.

THE TRIP:

Each child selects a tree to observe and makes notes in answer to these questions about it.

Touch the bark. How does it feel? Describe it.
Is it smooth? papery? rough? deeply grooved?
What colors can you see in the bark?
Note the shape and color of leaves. Describe.
Do you think this is a young or old tree? How can you tell?
Does it have many or few branches? How are the branches arranged?
How does the bark of the branches differ from the bark on the trunk? Look at the end of a twig.
Look at the rest of the branch. Are both the same color?
Based on the change of color can you find how much growth there has been this year? Can you see any of the roots? Do they have bark on them?

Supply each child with ample plasticine clay for him to make a print of the bark texture. The clay prints should be placed each in a separate box for the return trip. After returning to the classroom, apply ink or tempera to mold and print onto construction paper.

ACTIVITY #34 Trees

OBJECTIVES:

The student, after completion of this trip, should be able to:

Give observations that would characterize seasonal tree response, tree structures, and the decomposition of fallen leaves and branches.

THE TRIP:

General observations and recordings:

What do you see that is a sign of the season?
Describe the appearance of the trees.
Do the colors seem to indicate any particular season?
Do the plants that you see appear man-managed?
How do you know? What will an area that is not man-managed look like?
What materials here are not natural to this area? How do you know?
How would you improve this area? Why? Would this really be an improvement?

Observing trees closely:

Look at the trees.
Do these trees look the same as they looked at a distance?
Look at the leaves. What colors are the leaves?
Which leaf types are more abundant in this area? Sketch (or in some other way record) this type if you can't identify it.
Look at the trunk and note the characteristics. What characteristics will help you identify the tree?
Look at the color of the bark. What is its texture?
Is the bark the same in texture and color along the entire length of the trunk?
How does the base of the trunk appear? Is the base straight?
Is the base spread out?

Look at the fallen leaves on the ground.

Are they newly fallen leaves? How do you know?
Are the leaves very dry or wet?
Can you find the tree that these may have fallen from?
Compare growing, living leaves with those on the ground.
What is the biggest difference between the two?
What will the fallen leaves be like a year from now?

Look at fallen trunks or branches.

Look for signs of decomposition.
What will these eventually become?
How do you know?
How can you find out?
Which will decompose faster, fallen leaves or fallen trunks and branches?
Do you think decomposition occurs more in the spring or fall?
Support your answer.

ACTIVITY #36 Conifers

OBJECTIVES:

Students should be able to describe the silhouette, needle arrangement, cones and other distinguishing characteristics of at least five evergreens.

THE TRIP:

How many different types of evergreens can you find today? Keep a record.

Can you recognize different species by their silhouettes? What are some of the distinguishing characteristics of shape?

Do the branches droop? curve upward? reach out straight? Is the top pointed? Is the tree tall and spire-like? fanlike? bushy? symmetrical? low and spreading?

What arrangement of needles or branches gives the tree its silhouette? If you cannot reach the branches, where else can you look? Are evergreen needles round? Can you find evergreens with flattened needles? with triangular needles? square needles? hook-like needles? curved needles? Are the needles sharp? dull? prickly? sticky? smooth? furry? fuzzy? What color are they? green, green with black? blue-green? yellowish? Do any have white lines or markings? How long are the needles? How many are in a cluster? (If they are in clusters, how are they held in the cluster?) What type of mark does the needle cluster leave on the branch when it falls off? Are the needles all around the branch or just on two sides of it?

Describe the needles of different evergreens you have found.

How long are the needles? Measure ten and find the average. Are all the needles on the tree living? How can you tell?

Can you find the last year's (the newest) growth? Does the tree have cones? On what part of the tree do they grow? How are they attached? How long are they? How wide? Describe their shape, appearance, color and texture. How many cones are in one cluster? Are there different kinds of cones on the same tree? Do all the cones seem to have formed this year? Can you find any on the ground? Are seeds still in them? If so, examine and describe the seed.

ACTIVITY #37 Insects and Plants

MATERIALS NEEDED:

Magnifying glasses and insect identification books.

OBJECTIVES:

Students should be able to locate at least five evidences of insect activity on plants.
In the days following the trip, additional student interest may be stimulated by encouraging students to find out more about the role of insects in the web of life, by carrying out further investigations, by doing research, or by choosing library books on insects.

THE TRIP:

What evidences can you find of insects using parts of plants for food? for shelter? for egg depositories?
What parts of the plants have been used?
Does the effect of the insect (or its eggs which become larvae) change the plant in any way? Does it enlarge a part of the leaf or stem? Does it destroy part of the plant?
What part?
Has this change affected the whole plant or a part of it?
Which do you think more damaging, eating a part of a leaf or boring a hole in the fruit, and from whose point of view? Is this true in all cases?

Has the insect used the plant as a foundation for making a cocoon, web, etc? In doing this has the insect changed the appearance of the plant? How?

Investigate any galls or other evidences of insect alterations on plants. (Example: foamy white bubbles. These are produced by an insect called a spittle bug. It sucks the juices from a plant stem and mixes them with air to make a bubbly mass in which the young are hidden.)
NOTE: Be sure to have children examine tree leaves carefully, especially oak leaves, for galls. Also, the stems of goldenrod are often infected with insect larvae which stimulate gall production. If there are cherry trees or witch-hazel bushes in the area, these are also good subjects for investigation.

Describe the gall or web or other evidence of insect-caused plant modification you have found. What is the shape? texture? size in relationship to a familiar object? Is it solid? Is it hollow? Does the insect appear to be within? What makes you think this? Can you suggest a name for this gall or for the insect that made it? Can you find any examples of insects which are helpful to plants? How is this insect beneficial to the plant? What makes you think this?

Have most of the insect activities you have observed today been beneficial to or harmful to the plants? Would man consider these activities beneficial or harmful? Why?

What would happen if DDT or another insecticide were sprayed here? Would this be good or bad? From whose point of view?

If an insecticide were used which was harmful to chewing insects only, but not harmful to insects which gather nectar from flowers, would this be all right to use? Why do you think so? (NOTE: If children seem to agree that this would be an acceptable insecticide, suggest that some of them do research on the life cycles of butterflies, such as the Monarch and Swallowtail.)

What would happen to the insects if man and all his insecticides disappeared from earth?
What would happen to the earth, the vegetation and other animals?

What would happen to man if all the insects disappeared?

ACTIVITY #38 Observing Insects

MATERIALS NEEDED:

Pocket magnifying glasses, plastic sandwich bags for collecting and observing, net with three foot handle for catching flying insects, insect field guide.

OBJECTIVES:

After completion of this field activity, participants should be able to:

Pick out the insects from a series of pictures or specimens.
Name some characteristics of insects.
Based on observation, compare insect structure with human structure.
List words describing insect activity.

THE TRIP:

Where can you find insects? (Some may find you! Make the most of this. Look at them carefully. Be careful not to squeeze them - some may bite or sting.)

(Some places to look: Fields, woods, stream, marsh, pond, under logs or rocks, on trees and other plants, in galls, around lights after dark- nearly anywhere. Encourage children to suggest as many of these as they can.)

How can you tell when you have found an insect? (NOTICE three pairs of legs, three body sections and antennae.)
Look for an insect. Try to observe it in its natural surroundings, then try to catch it in a jar or other container. Examine its mouth parts with a magnifying glass. How does it eat? What do you think it eats? What was it doing when you found it? Does it have wings? How many? How many legs does it have? Which pair are the longest, or are they all the same length? What color is it? Does it have any markings? (If so, describe or try to draw them.)
Look at its head. Does it have eyes? Do they look like ours?

Does it have ears, nose, teeth, etc.?
Does it have other features on the head that we don't have (antennae)?
Describe them.
Look at its body. What words can you think of which might describe it? Is it hard on the outside or does it have skin like yours? Can you give the insect a name? (You might name it according to when you found it, what it was doing, its size, shape and color, whether it crawls, hops, flies or swims, or some other thing it looks like.)
Listen for insect noises. (NOTE: If you hear crickets chirping, you can determine the temperature by counting chirps for 14 seconds and adding 40.) These are especially plentiful in the fall. With special care and close observation, you may be able to find out how these noises are made.

ACTIVITY #44 Signs of Animals

OBJECTIVES:

Children should be able to:

Give three reasons why they did not see all the animals they expected to see.
Name, orally, at least 6 animals, traces of which were seen in the field and woods. This list should include at least one animal with fewer than 4 legs and 2 with more than 4 legs. Name, orally, at least four signs which indicate animals are present.

THE TRIP:

What animals do you expect to see here today? Why do you think you will see that kind of animal?

What do animals need in the places where they live? What kinds of foods are available here? What animals might eat these foods? Are there foods a (an) _____ would eat? What kinds of homes could animals have here? Do you see any place where a (an) _____ could live?

How would you go about finding out if the animals you mentioned are living here? What clues would tell you they were here even if you didn't see them?

(Note: If suggestions are not readily forthcoming, it may be necessary to ask: Do animals leave any traces when they eat? What sort of traces might you see? Where would you be most likely to find tracks? If the ground is too hard for tracks, are there any other signs that could tell you an animal had passed this way? Do animals follow trails? What makes you think so?)

NOTE: Many children are disappointed at not seeing large, wild animals, or as many animals as they expected to see.

Turn such a disappointment into a challenge with such questions as: Why didn't you see the animals you expected to see? Would you see more if you came at a different time of year? A different time of day? With fewer people? Why do you think so?

Did you find any trace of a (an) _____ here? If so, why do you think you didn't see the animal? If not, do you have any idea why not? Where would you have a better chance of seeing a (an) _____ Why?

Are there any reasons why people would not want _____ living here?

How was this part of the country different when only Indians lived here?
If most of or all of the people left this part of the country, do you think _____ would live here? Why?
Do you think more animals such as _____ and _____ should be brought here?
From whose point of view are you talking?
What would happen if those animals were brought here?
What changes might you see in the field (woods) if they were here?

ACTIVITY #45 Animal Homes

OBJECTIVES:

The children should be able to locate animal homes and identify what animals might live there.

THE TRIP:

Divide your class into small groups. Allow a period of five to ten minutes for the children to locate animal homes. Call all of the groups together and discuss what has been found. Let each group conduct a tour of its area.

Of what are the homes made?
Can you see where the materials were found?
Can you see any building materials that have come from some place other than the surrounding area?
Do you see any homes the animals live in but did not build?
What objects do you see in the shelters?
Did the animals bring them there?
How are the homes different?
What homes can you see that are high above your head?
What animals can be found on or near the ground?
What do you notice about the size, color, and position of the animal shelters that helpsto hide them?
What animals have you seen around your home or school that could use the animal homes we have seen.

ACTIVITY #48 Birds

MATERIALS NEEDED:

Pencils, paper

OBJECTIVES:

Students should be able to:

> Compare two or more habitats of birds, describing similarities and differences of these habitats.
> Describe differences observed in the birds of these habitats.

THE TRIP:

How many different kinds of birds do you see? hear? In what different places do you look to see birds?
Why are some birds easier to see than others?
Compare the sizes of birds.

Give several ways in which the birds you see and hear differ from each other.
Do you see any likely nesting places? In what ways do they look alike? different?
If you see a nest and can look at it without disturbing the birds, try to see what the bird used in building the nest.

Have students observe the flight of birds. Do all birds fly the same way? How do the flight patterns of birds differ?
Encourage students to use their arms to demonstrate several flight patterns.

ACTIVITY #49 Birds

MATERIALS NEEDED:

Pencils, paper

OBJECTIVES:

Students should be able to:

Give several evidences demonstrating that birds are present in a given environment.
Describe several different habitats used by birds.
Tell what attracts birds in each habitat.
Name several birds found in each of these habitats.
Describe several changes which can occur within a habitat, explaining the effects of such changes on bird life. They should be able to tell which of these changes they observed on the trip and what part man played in such changes. They should be able to predict the results of such man-made changes as blacktopping, cutting down trees, using pesticides, mowing and planting a hedgerow.
Differentiate several birds by song or call.
Be able to describe the field marks of several birds seen.
These field marks should include flight pattern and/or walk, song, distinguishing shape and/or colors. Upon referral to field guides they should be able to name these birds.

Given the silhouettes of several birds seen on the trip, and their names on another list, students should be able to match several names and silhouettes.

In the weeks following the trip, student interest in birds may be encouraged by their reporting, informally or formally, to the class or the teacher about birds seen in their home or school neighborhoods. Some might report the development of bird habitats around their homes or suggest ways of accomplishing this around their school grounds.

PRE-TRIP:

Listen to bird calls on records and look at bird pictures. Note color and silhouette of birds both perched and flying.

THE TRIP:

Suggested questions to guide pupil discoveries.

What sounds do you hear that tell you there are birds present?
Are any of these bird calls familiar to you?
Where do the bird sounds seem to be coming from?
Are the same bird sounds coming from all directions?
Is the habitat different in the areas where you hear differing sounds?
Are the birds singing or are they uttering call notes?

Do you see any signs of birds? Where?
What do the birds you see seem to be doing?

Do all birds move the same way? Do you see any that seem to walk? to hop? to waddle? Do they fly in a straight line, an up and down pattern? Do they flit around in the branches, move up and down the trunk?
Watch for ones that move in different ways and try to describe how they move.
How are the movements of the birds associated with their activities?

Do you see any signs that indicate birds are here, even though you may not see them?

What do birds need (at this time of year)?
How are these needs being met by this environment?
Has man contributed to making this an environment usable by birds? (if applicable)
Has man changed this environment in any way?
How might these changes have affected the (kinds of) (numbers of) birds here?
(NOTE: It may be necessary to call attention to certain types of plants, to the amount of cover, to recent evidences of mowing, to buildings.)

How would this habitat be changed if:
The grass were mowed - not mowed
A large area were blacktopped
Certain trees or shrubs were cut
The buildings were torn down
The area were sprayed with DDT or other pesticides to reduce the number of insects.
Would these changes help or harm the birds?
Would you expect to find birds here at other seasons? Why?

ACTIVITY #50 Hearing and Describing Birds

MATERIALS NEEDED:

Field guide to birds; paper and pencil

OBJECTIVES:

Children should be able to:

Describe or imitate three different sounds made by birds.
Name the two senses most useful in bird observation.
Describe two precautions to be taken to ensure bird observation.
List five general field characteristics helpful in bird identification.
Identify at least five birds (pictures) by use of a field guide.
Make a list of at least ten adjectives describing bird activity and behavior.

THE TRIP:

Are all the sounds you hear made by birds? How can you tell?
Could you tell better if you could see them?
What are some of the sounds you hear which are not made by birds?
Do all the sounds have the same quality? (Pick out some and try to describe them. Try to express them in words or sounds that you make.)
Do you think each sound is from a different kind of bird?
Why do you think this? Would you consider all these sounds made by birds to be bird songs?
Are all the bird sounds you hear made the same way? Do birds have voices similar to those of humans? Explain your answer. How else might they make noise except by the use of their voices?
Can you hear sounds that might indicate birds are making noises in different ways?
Can you see all the birds that you can hear?
When you do see a bird, what problems do you have in observing it?
Can you pick out colors or marks on the bird? Describe them.
What shape is the bird? Try to draw it in outline and put in the marks you may have seen. Compare your drawing to one in a field guide you may have available.

How many legs does the bird have? Describe them, if possible.
Does a bird have arms? If not, how does he pick things up? What is the general shape of the bird's bill? Draw it.
How does he use his bill?
What is the bird doing? Describe how he does it. How does he fly?
Is there a pattern to the flight?
How does he hold his wings? How does he move his wings and tail?
How does he sit on a branch? How does he move on a tree?

What adjectives can you think of which would describe the bird and his movements? Make a list. Now read your list and make sure it describes what you really saw when you looked at the bird, not what you thought about it.
What things can you find that might show that birds have been here? (Nests, woodpecker holes, etc.)

ACTIVITY #51 Field Study of Birds

MATERIALS NEEDED:

Pencil, paper for sketching and making notes, binoculars.

OBJECTIVES:

Students should demonstrate ability to take notes on field observations and to organize these, with information gained from reading and other observations, into an oral or written report. The report should show that the student has observed the bird's characteristic movements, song, feeding habits and preferred habitat.

THE TRIP: "

For each bird observed answer the following questions:

Does this bird spend most of the time in flight, flitting around in trees, on the ground? What is he doing in his activity? Where is he most frequently, at the top of tall trees, in the understory or shrub layer, or on the ground?

How does he move on the ground, by walking or hopping? When flying does he flap his wings, glide, or soar? How does he hold his tail? Are his wing movements regular or irregular, fast or slow? How does he hold his head? At What angle does he perch? Where does he perch?

Does the bird seem to be raising young? If so, where is the nest? What is its shape and size? What is the nesting material? What sort of activity is going on there? Can you hear any baby birds? Do both parents share in nesting responsibilities?

What does the bird look like (color, distinctive markings, shape, beak)? Does his color blend with his environment? What is his size compared with a robin, house sparrow and crow? Are male and female colored alike? What is his silhouette? How could you recognize him with the sun behind him or when he is in flight?

Draw his silhouettes, perched and flying. Imitate his walk. Sketch him in characteristic movements.

Include background in sketches to show habitat. What does he seem to be eating? Is his diet mostly grains, fruits, insects or ground-dwelling worms and grubs?

Is his choice of food likely to conflict with man's choices? Is he beneficial or a pest to man? to other things? With what other birds does he compete for food in this habitat? Does he seem to have any enemies? Does he pick on any other kinds of birds or animals?

What is his call? his song? Is it loud? soft? musical? harsh? Does he have an alarm note? What alarms him? Does he seem to have certain perching and singing areas? Could you put his call into words? Would you expect to find this kind of bird near your school? your home? Why?

ACTIVITY #53 Animal Traces in Wooded Areas

MATERIALS NEEDED:

Paper and pencil, hand lens, binoculars, ropes of string (1 yd.), keys for identification.

OBJECTIVES:

After completion of this field trip, the student should be able to:

Use skills developed in the classroom in the direct observation of animal traces found in a natural environment.

Support all inferences made in regard to animal traces with logical reasoning based on his observations.

Identify the traces of many of the animals that inhabit wooded areas.

THE TRIP:

General observations and recordings upon arriving at the area.

What season is this? (Early, late?)
What is the time of day?
How does the air feel? (Temperature)
What is the condition of the sky?
What is the direction and speed of the wind?
Look at the trees.
Are they moving? Do the trees appear to be conifers, deciduous, or a mixture?

Listen in silence.
What kinds of sounds do you hear?
Are the sounds coming from plants, animals, and/or man-made objects?
Is there repetition in the sounds you hear?
Describe the most outstanding sound you hear.

The next portions of the trip will be best accomplished if the class group can be divided into smaller groups of about 8-12 each. Each group can be equipped with binoculars, a set of identification keys, maps and camera.

Animal Traces in a wooded area

Look at the trees as you walk. Select a tree that appears scarred. Describe the scarring. Is it regular? irregular?
Is the scar fresh? Is it old? How do you know?
Is the tree living? How do you know?
Look for insects on the tree.

Look for bird traces in trees. Describe them.
Look for bird traces on the ground.
How were these traces made?
Record notes about these traces that will help you to identify them if you don't know what they are.

At which season are you more likely to find egg shell traces of birds?
If you find a feather, look for others close to the same area. Why?

Rope ring (The Woods Floor)

Place your rope ring on a leaf-covered section of the wooded area. Pick up the leaves in the ring and carefully observe the contents for animal traces.
What do you see in the leaves?

Look carefully at the ground under the leaves.
What do you see that doesn't look like a leaf?
Is anything moving? Describe it - shape, number of legs, lack of legs, wings, color.
Feel the leaves and earth. How do they feel, cool - warm, dry - moist, hard - soft?
How many different kinds of living organisms have you found?
What various stages of development in insects can you see? (Egg, larva, pupa, adult)
Look for other traces of insects. (Cocoons, webs, holes)

Under a rock:

Lift a rock or pull it back and look over the far edge.
Describe the earth under the rock. What is its color?
Describe any living organisms you see under the rock as to type, size, movement, color or lack of color.
Replace the rock in the same spot. Why?

Other animal traces

Listen for sudden sounds at ground level.
Look for signs of partially eaten plants, fungi, nuts, etc.
Look at leaves on growing plants. Do you see any indications that insects have been eating the leaves? What parts?
What would happen to a plant if the insects ate all of the leaves?
What would happen if the leaves were no longer available to the insects?
When does man try to control this?
What are the effects of man's seeking to control insect infestations?

Bones, fur and feathers

Look at and feel these remains if you find them.
(Explain that the children can examine animal remains but that these are best left in the area where they are found; that this is a natural phenomenon by which materials are re-cycled back to the soil.)
Examine the surrounding area for additional traces.
What remaining parts will help you to identify this animal?
Is this the remains of a bird, mammal, reptile, fish?
How do you know this?

ACTIVITY #54 Finds

OBJECTIVES:

Students should be able to name several ways in which objects not native to a particular habitat may be introduced there. They should be able to give examples of things seen during the field trip that did not originate in the area observed.

If litter (introduced by "man") was in evidence on the trip, children should show an increased concern over litter on the school ground or within the school, picking it up, and encouraging others to do so.

THE TRIP:

What can you find that seems to have come from another area? Why do you think it did?

(NOTE: Finds may range from nuts brought in by squirrels, seeds washed in by rain or blown in by wind, and litter thrown in by man, to once-in-a-lifetime oddities.)

Where did it possibly come from? How might it have gotten in here? What will become of it in here?

If wind-blown seeds are in evidence: Can you play detective and track down the source?

Can you find anything man brought in? Do you think grown people or school children brought it? Why?
Can you find anything a squirrel might have brought in? Can you find anything a bird might have brought in? Can you find anything the wind might have brought in? Can you find anything the rain might have washed in? Can you find anything that came from nearby trees, shrubs or vines? Did you find any seeds? Can you find anything that is creeping in from the surrounding land? Can you find anything which insects might have brought here?

Could all the seeds found here grow? Should the things that did not originate here be removed? What will happen if they are allowed to grow?

ACTIVITY #55 Plot Study

OBJECTIVES:

Delimiting a specific area, the student should be able to list the kinds and/or characteristics of five items found in that area. Examination of their findings using the senses of sight, smell, touch and hearing will be encouraged.

THE TRIP:

Mark off a portion of ground.

How many kinds of plants can you find?
How many different things can you find that are not plants?
Does the soil in the marked section look the same in all parts?

Feel the soil. How does it feel? Does it feel the same in all parts of the section?

Do all of the plants in the section feel and look alike? How are they different?

Can you find any insects? other animals? Are they on the plants or on the ground? Do you find the same insects in both places? Can you find any signs of animal activity?

Are these insects and animals affecting the plants? How?

ACTIVITY #56 Mature Forest: Layers

OBJECTIVES:

After or during the visit to a forest, the student should be able to identify the five layers of a stable or mature forest. (Floor, herb layer, underbrush or shrub, understory and canopy.)

The student should list animals that make their homes in the forest and tell in which layers the homes would most likely be found.

After observing whether there is little or considerable sunlight reaching a particular layer of the forest, the student should be able to point out indications of this amount of sunlight as shown in plant growth.

A student should be able to list two reason why this forest should not be destroyed.

The student should be able to give reasons why he would or would not like to have this forest near his home.

THE TRIP:

Divide class into groups of five or six children. Each group observes a different layer of the forest (floor and herb layer, underbrush or shrub, understory, canopy) in an area of approximately ten feet square.

What are the stems of the plants like? Are they woody or herbaceous? Feel them and describe them. Are they rough? smooth? thorny?
How many different kinds of plants can you find?
Examine the leaves. Describe their shapes and colors. Compare the size of leaves on plants from your layer with size of leaves on plants of another layer.
Are there flowering plants on your layer? How can you tell?
Examine the soil around the plants. Feel it. Is it damp or dry?
Is this soil mainly clay, sand or humus?
Can you find decaying matter around the plants? Do you think it has always been there? Will it be there next spring?
Do the plants get much or little sunlight?
What signs of animal life can you find? Listen for sounds.
What kinds of animal homes can you find in each layer? What are they made of?

Describe their shapes and sizes.

Will the plants of the forest floor ever be a part of the canopy?
Do you think the canopy ever looked like the floor?
Describe what you think your layer will look like in twenty years.

ACTIVITY #57 Comparison of Woods, Fields and Marsh

OBJECTIVES:

Children should observe several relationships between plants and animals.
Children should know a plant found usually in the woods, another found in a field, another near a marsh.

THE TRIP:

Plants

What is there about the plants in this area that is different from plants in other areas: size? shape? color?

How many different colors can you see? (Ask this question in several areas during walk).

Have children make up names for the plants (if they don't know given names) that would help to identify them at a later time (e.g., umbrella plant for mayapple - tooth plant or saw-edged plant for toothwort).

Observe different plants in different locations throughout tour.

Look at trees in areas visited. What do you notice about the trees? buds? flowers? leaves? Compare the colors, sizes, and shapes of the leaves or buds. Does the texture of the bark change? Do you see signs of birds in the trees? signs of other animal life? Are there stumps with animal homes? fungi? insects?

Find holes in the field. Could they be animal homes? What else might they be? Do you think they are recent holes? Are there signs of present inhabitants?

Birds - do you hear or see them? Are there different kinds? Do you see any nests?

Where can you find insects: in stumps? on plants? on trees? on the ground? in the ground?
Observe plant and animal life in a stream or marsh.

Are there different types of plant and animal life in streams or marshes than are in the woods and field?
What are some of the differences?

ACTIVITY #58 Forest and Field

MATERIALS NEEDED:

Hand lenses; plain paper for each child

OBJECTIVES:

Given a prepared diagram, the student should be able to label correctly the five layers of the forest: forest floor, herb layer, shrub layer, understory, canopy.

The student should be able to construct a possible food chain based on the plant and animal life seen in the field or forest. The food chain should include at least three links: producer, first order consumer, and second order consumer.

THE TRIP:

In the field: What would be the first link in a field food chain? What might be second? third? fourth? What are the producers? Are the producers the same in the forest and field food chains? Why do you think plants can produce food and animals can't?

In the forest: Observe the layers that make up a forest. What plants make up the herb layer, shrub layer, understory and canopy? What is the forest floor composed of? What animals find shelter, food, or protection in each of these layers? What might be the first link in a forest food chain? the second? the third? What are the producers?

What animals can you find? Are any smaller than a quarter? Examine them with hand lenses. What color are they? How are they shaped? How many legs do they have? Do they have wings? Do they have eyes?

Are the same kinds found in woods and fields?

What animals are found here in the greatest numbers? How many kinds of insects can you see? How many can you hear? What evidence would tell you that insects have been living here even if you couldn't see them or hear them?

Give each class member a white sheet of paper to place on the ground. Watch it carefully for five minutes. How many kinds of insects do you see? Did anything else collect on the paper? What are the insects in this field doing?

ACTIVITY 59 - COMPARISON OF CONIFEROUS AND DECIDUOUS WOODS

OBJECTIVES:

After a trip to a deciduous woods and to an evergreen woods, children should be able to direct the teacher in constructing a chart showing how one area differs from the other in ground cover, amount of sunlight, colors, odors, sounds, plant life, and animal life.

THE TRIP:

Visit a deciduous wooded area; then, an evergreen woods.

What is different about this area compared with the one you just came from? What is the same here?

How does the ground feel here? Is it harder here than in the area you just came from? Why is this type of ground cover here?

Does this area have an odor? What does it smell like?

How many different colors can you see? How many different plants can you find here? What signs of animal life do you see? What signs of spring (fall, winter) are here?

What do you notice about the trees in this area? Does this tree have leaves and fruit? How many different kinds of trees are growing in this area? How can you tell different kinds of trees? Can you tell how old the trees in this area are? How?

What are some reasons for having an area like this?

What will the trees in this area look like in fall? winter? spring?

On the way back from the field trip have children look for examples of deciduous (broad leaf) and coniferous (usually evergreen) trees. Ask them to tell what is different about them. (In the winter, evergreens are easily distinguished from deciduous trees.)

Is this evergreen a native of North America? of eastern North America? If not, does it seem to be growing well here? Are there other specimens of it here or anywhere in your neighborhood?

Try sketching the tree: silhouette, needles, cones, a branch or bark.

Could you recognize this species of evergreen again if your bus passed one?

ACTIVITY #60 Fallen Tree

OBJECTIVES:

The students should be able to:

Tell whether a tree was felled by natural causes or by man. Describe some animals that live near or on a fallen log and give one reason why this is a good habitat for each animal. Name some organisms that help in the decomposition of a fallen log. Tell why a fallen log is an important part of the forest. Describe what this log may look like in ten years.

THE TRIP:

Find an area with some fallen trees. Select one to observe.

Does the bark look smooth? How thick is the bark? Touch the bark and describe how it feels. Is the entire trunk covered with bark or is there a lot removed? What do you think removed it?

Is the color of the underneath wood the same as that of the bark? Can you explain the difference in color?

Is there anything living on the outer surface of the bark? Remove a small piece of the bark. Do you find living organisms on the inside? What are they?

Can you find signs of animals living around the fallen tree's base (stump)?
Observe the stump of the tree. Is it smooth or irregular to the touch? Is anything adhering to it?
What do you think caused this tree to fall? Why?

Count the rings on the trunk, if possible. About how old was the tree when it fell?
If this tree is not moved, what will it look like in ten years? in twenty-five years?
How could man use this fallen tree? Should the fallen trees be removed from this area? Why or why not?

Should trees ever be cut down? Why or why not?

ACTIVITY #61 Awareness - Pine Woods

MATERIALS NEEDED:

Paper, crayons, pencil

OBJECTIVES:

Given a set of sketches or phrases describing sounds, colors, moods, lines, and activities, children should be able to choose those which remind them of the trip to the pine forest.

The class should be able to make a list of adjectives which could be used to describe the pine forest and objects observed there.

In the weeks following the trip, students should:

Evidence new appreciation of the out-of-doors in their choice of library books, pictures brought in, and creative expression.

Evidence an appreciation of the effect of environment on mood by the comments they make, the pictures they bring in, the books they read, their creative expression, and by their reaction to experiences in art and music.

THE TRIP:

After walking some distance into the pine forest:

What do you see? What colors, shapes, and lines seem to predominate?
What do your hear: footsteps? birds? insects? Are they in the pine woods or outside? Can you hear silence?
What do you smell in the air or when you sniff objects such as trees, other plants, and the forest floor?
What do you feel? Run your hands over the tree trunks. Dig in the duff on the forest floor.

Step from the woods into the field; then, back again.
What differences do you notice: in light and temperature; in the sounds when you walk; in the sounds of the animals around you; in the humidity, smells, and colors; and in the way you feel inside?

When you are deep in the pine forest, can you tell if it is cloudy or sunny? Why or why not?

Step into a sunny spot in the pine forest.
How is it different from the shady spot: temperature? smell? light? Do the differences you feel make a difference in the kinds of plants and animals here? How does the sunny spot in the forest differ from the sunny field?

Find dead and decaying logs. Look at them. How do they look? How do you think they feel? Handle them. How do they feel? How do they sound when you tap on them? How do they smell? Compare them with living trees. How would you describe the differences?

What words might you use to describe this pine tree? a fungus? a vine? the duff on the forest floor? other plants?

Go to the edge of the pine forest. Look up toward the sky. How would you describe the pattern of the pine needles against the sky? their shape? color? Try sketching them in color. How would you describe the pattern of deciduous leaves against the sky? their color? shape? Try sketching them in color.
Is the sunlight coming through or being reflected by the deciduous leaves? the needles? Why do you suppose this is true?

Describe the edge of the pine forest.
How is it different from the interior parts? How is it similar?
What animals might be found at the edge of the forest that you did not find in the depths? Why?
At the edge of the forest, can you tell if it is cloudy or sunny? Why?

ACTIVITY #64 Streams

MATERIALS NEEDED:

Strainers, small containers, collecting trays

OBJECTIVES:

Children should be able to name three things that live in a stream.

THE TRIP:

Follow stream in both directions. (About 10-15 minutes each direction)
Let children explore stream on their own to discover plant and animal life in and around stream.
Give them the opportunity to point out different things as they observe them, such as fish, insects, frogs, moss, grass, flowers, other plants, etc.

Have children sit near stream and talk about what they have observed. If possible, allow children to feel water, plants in the water, and moss covered rocks; to smell skunk cabbage; to examine other plants in area.
Let children tell how things feel, smell, look.

How many different colors do you see?
Are the colors the same in the stream as around the stream area? Are they darker? duller? brighter? Why?

What do you hear? How many different sounds do you hear in this area?

What does it smell like here?

Do you think the water is cold? warm? why? Now feel the water. How does the water feel? Does it feel colder or warmer than you thought it would? What could be some reasons for this?

Hand out strainers and small containers and return to same areas. This time look in mud and under rocks and leaves in stream. Are you able to find any animals that you didn't see before? Why do these animals live where they do?

Examine and study flow of stream

Where do you suppose the water comes from? Could you find the beginning? Does it have an end? Where does the water go when we can't see it anymore?

ACTIVITY #65 Stream Study

MATERIALS NEEDED:

Strainers or dip nets; white enamel pans; small, wide-mouthed collection jars; identification keys; tape measure, stop watch, cork float; hand lens; thermometer; pencil and paper.

OBJECTIVES:

After completion of this field trip, the student should be able to:

Make simple, accurate measurements, using the instruments provided.
Given a list of observations and inferences, distinguish between observations and inferences.
Describe techniques used in collecting and identifying stream-dwelling specimens, and successfully collect and identify at least one specimen, returning it to the stream uninjured.
Measure water temperature and speed of flowing water.
Describe a stream food chain.

THE TRIP:

The Water's Edge

Does anything that you observe indicate the season at this point?
Measure the temperature of the water.
What does the soil at the water's edge look, feel, and smell like?
Look across the surface of the water. Is the water still or flowing?
If the water is flowing, measure the speed by marking off a 10 foot distance along the bank. Drop a cork at the beginning of the distance and, using a stop watch, measure the time it takes the cork to travel the 10 feet. From this, the current flow can be calculated in feet per second. Collect organisms from the flowing water. Compare them with organisms found in still water.

What signs of and types of activity do you see or hear?
Does the flowing of water affect the number or types of organisms found in the water?
What are the color and clarity of the water?
Do you see signs of water pollution?
What do you see that indicates the water is or is not polluted?

Look at plants growing close to the water; in the water; a distance from the water. Are there signs of man's influence at the water's edge? What are the colors of the plants, their leaves, branches, flowers, etc? Do they look like the plants seen in the distance?

Living Organisms
(Insects)

How many different kinds of insects has the group collected?
Were eggs collected? How do you know that they are eggs?
How many legs do the insects have?
What methods of moving do you see being used by various insects?
Why do you think some insects fly? Why do some swim, walk, float, etc? Are all the insects in their final stages of development?
How do you know? What do the insects eat? Can you see their food? What may use the insects for food? Can you trace a food chain of the stream?
Which of these insects annoy man?
How does man try to control insect populations?
Does man always do "good" by spraying for insect control?
What happens to a food chain when certain members are destroyed?

Living Organisms
(Amphibians)

What evidence do you see of amphibian life?
What do you see? What do you hear?
Do you see various stages of frog transformation from egg to tadpole to adult? Which stages do you see in the water?
Which do you see at the water's edge?
What do you think will prey upon amphibians in the food chain? What do amphibians prey upon?

Living Organisms
(Reptiles)

Have you seen a snake today? Did you see a snake in the water?
Are all snakes poisonous?
Can you trace a food chain containing a snake?
If you have the opportunity, touch a snake. How does it feel: dry, moist, slimy?

ACTIVITY #66 Pond Succession

OBJECTIVES:

Children should be able to predict, in writing or drawing, what the pond environment will be like in 25 years and to give at least three observations made at the pond which have led to this conclusion.

In the weeks following the trip, some children should voluntarily visit other pond (or marsh) environments and describe their observations, either in conversation with the teacher, reports to the class, or pictures for the bulletin board.

THE TRIP:

NOTE:
This should be a "second trip" activity for a class which has already visited the pond to investigate the animal and plant life in it.

What is a pond?
Why is the pond here?
Will it always be a pond?

Where is the water coming from?
Where is the water going? Is any water going out that you don't see?
Does the amount going out equal the amount coming in? How can you tell? Why do you think this is the case? When might the amount going out exceed the amount coming in?

Observe the surface, shores, and bottom of the pond as well as the stream that feeds it. What else is coming into the pond besides water? How are these things coming in? Where are they coming from? Where will they go?
Where is most of the soil that has washed into the pond located? Why? What becomes of the leaves and other plant materials that enter the pond? Why?
Is this material (soil and plant materials) beneficial or harmful to the pond and its life? Why?
What changes will the invaders make in the pond over a period of time?
Will these changes be good or bad? Why do you think this?
How could man prevent these changes?
Would it be desirable to do so? Why do you think this? From whose point of view are you answering?

Do you see any indications that the shoreline is changing? Describe what you see and what you think is happening.
What parts of the shore show "overuse" by man? Do you think such intensive use will affect the pond? Why do you think this? How could it affect the pond?
Is this intensive use good or bad? From whose point of view?
What would the shoreline be like around the pond if it were fenced off and we couldn't get in close? Can you find any evidence to support your opinion? Would it be desirable to fence off portions of the shoreline from time to time? Why do you think so?
Is there anything that could be done to protect the shore from overuse?

What plants are growing along the shore? Where are their roots?
What will become of the seeds from these plants if they fall into the water? Why do you think this?
Will these plants continue to grow here? Will their numbers increase? Why do you think this?
How do you think these plants will change the pond environment?
Will these changes be good or bad? From whose point of view?

What seeds have fallen into the water other than those from plants at the water's edge? Where did these seeds come from?
Will plants grow from these seeds? Where? Why do you think so?

If this pond does eventually disappear, what will become of all the animals that live in the water? Why do you think this?
Will this happen all at once?

ACTIVITY #67 Marsh: Plant Life

OBJECTIVES:

The observer should be able to describe, in his own words, two types of plant life at the marsh. His description should include his observations as to whether the leaves of this plant shed or retain water and his ideas as to why the leaves react this way.

THE TRIP:

How many different colors do you see?
Does this area have an odor? What does it smell like?
Describe in your own words what the plant life looks like.
Do plants around the marsh area differ from plants in other areas?
Can you suggest some reasons why? How do they differ?

Have children discover that some plants retain water on their leaves while others seem to shed water (or water "beads" on the leaf surface). Have children take turns putting water onto various leaves to see what happens.

Try several leaves that grow around the marsh area: leaves from trees, skunk cabbage (why so named?), mayapple, jewel weed (why so named?), others.

What would happen to the plants if each child who came here took one leaf from the different plants?

What would happen to the leaves on these plants if it were to rain very hard for a few hours or longer? Do you think all plants need water? Do they need the same amount? Why do you think this?

Are there any plants growing in the marsh? Do they look different from the plants growing around the pond? How? Give some reasons why. Do you think these plants could grow in places other than in the marsh? Why?
What do you think causes water to "bead" on some plants, soak others and leave others dry? Have you ever seen anything like this anywhere else?

ACTIVITY #68 Marsh: Animal Life

MATERIALS NEEDED:

Strainers, small containers, large collecting pan, pictures of pond organisms to help with identification.

OBJECTIVES:

The observer should be able to describe, in his own words, two types of animal life found in the marsh. He should be able to describe differences between animals that live in the marsh and animals that live in other areas.

THE TRIP:

Use strainers to catch organisms from water, leaves, and mud. Place in water in small container. Transfer to large collecting pan, making sure that water is clear enough for observation.

Describe in your own words what the animal life in this area looks like.

Pretend you are telling about the marsh to someone who has never seen a marsh and probably will never see one.

How is the animal life in this area different from (or similar to) animal life in other areas?

What types of animal life are found in the marsh? How do you think the animals got there? What do you think they eat? How do they get their food? What would happen if no animals lived in the marsh?

What happens to the animal life during the winter? Do you think the animals stay in the marsh? Where could they live if they left the marsh? What would happen to the animals in the marsh if it never rained?

ACTIVITY #69 Marsh Life

MATERIALS NEEDED:

Strainers, collecting pans, collecting jars, (enough for each child), pencils, writing paper.

OBJECTIVES:

Be able to recognize, from a group of pictures, three marsh animals.
Be able to give some needs that man satisfies from his environment and compare these with the needs of one marsh animal.

THE TRIP:

Do you see anything living in the marsh? What size is it? What does it look like? What colors do you see? How is the marsh area different from the nearby field?

Do you see any animals in or around the marsh that use the water in a way similar to the way we use it?

Water strider - swimming motion
Frog - swimming motion
Birds - drink it and get food from it
Forest animals - drink it and get food from it

What kinds of food could we get from the marsh?

What plants or animals do you know about that could live in the marsh?
What daily activities must the marsh animals carry on that man also must carry on?

Eat
Breathe
Activity - rest
Excrete
What others can you think of?

What do the marsh animals eat?
Do they need air? How do we know the animals use air?
How can we find out about the activities of marsh animals?
What have we been doing that could help us to understand the activities of marsh animals? What else could we do?

What would happen to the marsh life if the marsh became dry?
How could the marsh become dry?
How might the area change if the marsh disappeared? What would happen to the birds and other animals?

Use the strainers. Dip and collect marsh life. Discuss the objects and animals you've collected.
Have each child choose one of the animals and put it in a baby food jar. Ask the children to pretend they are that animal and write a story telling what their life is like.
Return the animals to a centrally located collecting pan and have the children sit around it.
Ask each child to read his story. See if the others can guess which animal the story was about.

ACTIVITY #70 Marsh Life

MATERIALS NEEDED:

Dip net or strainer; enamel pans; bulletin board; cut-outs of common pond animals; crayons and paper; thumb tacks; scissors.

OBJECTIVES:

Children should be able to:

Suggest at least two ways in which characteristics of marsh animals may have been the inspiration for inventions. Describe, from first-hand observation, the physical characteristics of various marsh dwellers. Differentiate between knowledge gained by personal observation and that acquired through reading or hearsay.

THE TRIP:

What animals do you expect to find at the marsh? Do you expect to find them in, on, or around the water?

When you find an animal, bring it back to one of these pans; or, if you can't catch it, find its picture in this pile of cut-outs and tack it on our board, or draw your own picture.

Let's see how many of these animals you really can find in 10 to 15 minutes.

Fish

How does a fish swim? What parts of its body does it move? Does it move its whole body? How does a fish "stand still" in the water? Can a fish see you on the shore? How? How does a fish get air? Why do you say this? How does a fish's body illustrate streamlining? How has man copied the fish?

Frog

How does a frog get air? How does the skin of a frog differ from the "skin" of a fish? How do the eyes of a frog differ from the eyes of a fish? Do you think the frog sees you coming, or does he hear you? Why do you think this? How could you find out for sure?

How can a frog jump so well? How is a frog adapted to life on land as well as in the water? How does a frog eat? What does he eat? Does he get his food in water, on land, or in the air? What did you observe that gave you this idea? What is the advantage of the frog's coloring? How does the way a frog swims differ from the way a fish swims? What are the frog's adaptations for swimming? Do you swim more like a frog or a fish? Why? Has man copied the frog in any way? How?

Tadpole

How does a tadpole swim? How does this compare with the way a frog swims? a fish? How does a tadpole get air? How does this compare with the way a frog gets air? a fish? What does a tadpole eat? Did you observe one eating? How does this compare with what the frog eats? a fish? If you don't know, how can you find out? Why do you suppose tadpoles are found in such large groups in the shallow water? Will they always stay there? Why do you think this? How will a tadpole have to change to become a frog? How is a tadpole like a fish? How is a tadpole unlike a fish? Is a tadpole more like a fish or a frog? Why do you say this?

Insects

(Water strider, diving beetle, whirligig beetle, water boatman, back swimmer, etc.)

How does a _____ stay on the surface of the water? Does he? How does it move from place to place? Would you say it swims? How does it get air when it goes underwater? Could these insects live away from water? How could you find out? What do you think becomes of these insects during winter? How could you find out? Has man designed anything which copies this insect?

(Mosquito larvae, dragonfly larvae, damselfly larvae, etc.)

How does this insect breathe? What do you observe that makes you think this? How does it move? Would you say it swims? Could it live away from water? Has man designed anything which copies this insect?

Which of these animals would be the first to be affected if the marsh dried up? Why do you think this? Which of these animals would you like to know more about?

ACTIVITY # 73 Any Rainy Day

MATERIALS NEEDED:

Foul weather gear

OBJECTIVES:

After this field trip the children should be able to:

Compare conditions on a rainy day with those on a dry day.
Describe the patterns made by falling raindrops, and discuss possible causes.
Discuss methods of shelter from rain.
Compare erosive power of water on bare ground and planted ground.

THE TRIP:

What can we observe on a rainy day that we can't observe on a sunny day?
What things don't change even though it is raining?
How do you feel on a rainy day that's different from the way you feel on a sunny day?
What do we need to keep from getting wet? Does it work? Do we remain dry? What happens to us if we do get wet?

Measure the temperature of the air and a puddle of water using a thermometer. Do you think the air would be warmer or cooler if it were not raining? What might cause the difference?

Does the rain come straight down? Does it slant? Does it curve? In which direction is it slanting or curving? What might be the cause?

Where does the rain come from?

Where does the rain go after it lands? Look at the leaves or twigs it lands on. Where does it drip off? Where does it fall after it drips?

Does the rain help the plant it lands on? If so, in what ways?

What does the rain do to the ground? (Find a spot of bare ground and compare it with a place with leaf cover and one with grass growing on it. Make students observe these closely, and don't accept answers based on guessing or prior information.)

In what places does the ground wash away? Does it wash as much where there are trees and plants? Why do you think this seems to be true?

What do flowers do in the rain? Where do animals go in the rain? Stand under some trees. Is a tree much shelter from the rain?

If you were a rabbit or other terrestrial animal (bird, insect, snake, etc.) where would you seek shelter?

If you were a fish or other pond animal, what would you do in the rain?

What patterns can you see in the rain? puddles? clouds?

What color is a rainy day?

ACTIVITY #74 Rainy Day

OBJECTIVES:

The student should be able to describe characteristics of the area observed that are present only during rainfall.

THE TRIP:

What sounds do you hear as you walk in the rain? What sounds do you hear when it is raining that you wouldn't hear when it is dry?

Are the sounds of rain the same everywhere you walk? How are the sounds alike? different? Where do the sounds of rain seem to be the loudest?

Look at your footsteps as you walk. Do they look alike everywhere you walk? Do they sound the same? Do they feel the same? Would you see these things if it were dry? Does it have to rain in order for you to see these things and hear these sounds?

What words describe the sounds you hear and the things you see as you walk in the rain?

ACTIVITY #76 Rainy Day

OBJECTIVES:

Students should be able to:

Describe the way various surfaces react to water.
Compare the differences in levels of land and relate these differences to the movement of rainwater.
Describe rain in terms of sound, feel and effects on color.
Name some things you could do or observe on a rainy day which could not be done or observed on a clear day.
During future rains, teachers may stimulate continued student interest in making rainy day observations, either as a class or individually.

In conversations with the teacher, or with their classmates, encourage students to describe some of their observations.

THE TRIP:

What color is rain?
How does rain affect other colors? Examine lichens and algae on wet and dry portions of tree trunks. What color is a rain drop on a branch? on a leaf? on a flower? in the air? bouncing out of a puddle?
What shape is a raindrop bouncing out of a puddle? falling through the air? hanging on a branch, on a leaf, on grass? Look through a raindrop hanging on a branch. Describe what you see.
Count the seconds between the time a raindrop falls from a branch until another one collects in the same spot and falls. Compare your raindrop count with that of a friend counting raindrops on another branch. Whose raindrops drop faster? Why?

Do raindrops always collect at the same place on a branch? Why do they collect where they do? Are all the raindrops on your branch the same size when they fall? Notice the length and width of raindrops. Find the biggest raindrop you can. Find the smallest. Is there a relationship between raindrop size and how often they fall from a branch?

Look at the surfaces of different kinds of leaves, such as mayapple, violet, garlic, jewelweed, different grasses, solomon's seal, holly, beech, maple (or whatever variety of leaves are common and in season).

Do they look wet? Do they feel wet? Are some wet all over or just in spots? What spots? Be sure to look at a leaf from several angles. Does there seem to be a characteristic texture to leaves that are wet just in spots? Try to describe what you feel. Have you ever spilled water and watched it bead in spots only? Where did that happen? What reasons can you think of that might cause some leaves to be wet in spots only? Are your explanations really facts or are they inferences? NOTE: Take time for the group to share their opinions on this subject and to evaluate them.

Turn some of the leaves over and observe how the rain "wets" the underside. Does the leaf's underside react the same as the leaf's upper surface? Does the underside look the same as the upper surface? Does it feel the same?

Look carefully. Can you find any leaves with "down" on them? How do these leaves look in the rain? How do they feel?

How do plant and leaf shapes shed or hold water? What happens to the rain that falls on the leaves of different plants?

Find some plants that are in bloom. Are the flowers open or closed? Why might this be?

Can you find some things that look dry but are wet?
Can you find some things that look wet but don't feel wet?
Can you find anything that is dry? Why is it dry?

Feel the dead leaves on the ground. Are they wet? How would you describe the feel of the wet leaves? Try to find some dry dead leaves. Do they feel the same as the wet ones? Do wet dead leaves feel the same as wet living leaves?

Listen to the rain on your raincoat, rain hat (umbrella, poncho, or whatever it is!).
Stand under trees and listen; stand in the open and listen.
Do all raindrops sound alike? Do you hear as many in both places? Describe the differences. What seems to cause the differences in sound? Can you hear rain more easily under trees or out in the open? Listen to the rain falling on the ground under trees and on the grass. Listen to rain falling into a puddle and, if possible, into a stream. Try to describe what you hear. Is what you hear rain or wind?

Smell! How do these things smell when they are wet: on grass, different bushes and flowers, tree bark, dead leaves, the earth, your raincoat?

What do animals do in the rain? Look for spider webs. Are they wet? Are they wet all over? Are the spiders in them? Do the spiders look wet? Look for insects. Do they look wet? Where are they? What do they seem to be doing?

Do you hear any birds? Do you see any birds? Where are they? Are the birds you see making any noise? What do they seem to be doing?

Watch for other animals. Do you see many? What are they doing? Do they look wet?

Find some puddles. Do you find more puddles on the driveway, on the grass, under trees?
What is the surface of the earth like where you find the puddles? What covers it? Is it flat? sloping? What is the area around it like? How does the area around the puddle feel when you walk on it? Compare the height of the area around it with the area where the puddle is.

Is the drop that you see bounce up the same drop that fell into the puddle? What makes you think so? What happens when a raindrop hits the puddle? Describe what you see.

Guess why puddles form where they do and not in other areas. Think of places near your house where there are many puddles during a rain. How are those places like these places that have puddles?

Where does the rain go that doesn't go into puddles? Where will the rain go if this puddle gets bigger? Where will the water in this puddle go when it stops raining? What good are puddles? Are puddles ever not good? Where? When? Why? Do raindrops falling in a puddle look like raindrops falling on a pond? Do you think a pond is really a big puddle? Why?

ACTIVITY #77 Rainy Day:
Woods and Marsh

OBJECTIVES:

After two field trips to a marsh and a woods, one on a clear day and one on a rainy day, children should be able to construct (with direction from the teacher) a bulletin board or chart showing similarities and differences in the animal and plant life as observed in different weather conditions.

THE TRIP:

Have the children observe marsh and wooded areas on a rainy day. (Be sure to dress properly - boots and rain gear.)

What do you see on a rainy day? Do you notice any changes from other days? Are colors brighter or more dull?

What do you notice about plant and animal life on a rainy day? Are they much different from a fair-weather day? What are the differences?
What things are the same?

What does the marsh look like in the rain? Are there any signs of animal life?

Are there any changes in the marsh brought about by the falling rain?
Are there algae? ripples in the water? What is the water level?
Is the water moving?
What is the condition of the area around the marsh?
What do you think would happen to the marsh if it never rained?

What do you notice about the birds in the rain? Are they quiet? noisy? Do you see many birds around? Where do you see the birds: high in the trees? under trees? splashing in rain puddles? not in sight?
What kinds of shelter do you suppose they find?

Count the raindrops on a leaf or several leaves.
What do raindrops look like?
Does the rain affect the leaves or plants in any way that you can see?
Do they droop? Why or why not?

Where do you think the animals go when it rains? Can you see any? hear any?

How do the woods and marsh smell during a rainstorm? After a rainstorm? How are the smells different from the smells when there is no sign of rain?

Do all areas of the woods receive the same amount of rain? How can you tell? Can you find any dry areas in the woods during a rainstorm? What are some reasons why not all parts of the woods are equally wet?
(Examine the soil directly at the base of a tree and some about two feet away. Which is damper? Why?)

List observations made in woods and marsh during a rainstorm, and make another list of things observed when there is no rain.

ACTIVITY #78 Windy Day in a Forest

OBJECTIVES:

Students should be able to notice changes that occur in a forest on a windy day. The student should be able to describe verbally four observations he made when the wind was blowing and compare them with observations made during a period of relative calm.

THE TRIP:

How many different sounds can you hear when the wind is blowing?
Can you hear the same sounds when the wind isn't blowing?
What happens to the trees when the wind blows?
Can you tell the direction of the wind by watching a tree?
How?
Does the wind always blow in the same direction?
Can you feel the movement of a tree by touching the trunk of the tree as the wind is blowing? What part of a tree sways most?
Can you tell the speed of the wind by looking at a tree?
Do all trees move when the wind blows? Do all trees move the same?
Which trees move most when the wind blows? What words describe the trees that have the most movement when the wind blows?
How could the wind be damaging to the trees?
Can you find any trees or parts of trees that might have been blown down by the wind?

ACTIVITY #79 Rocks and Minerals

OBJECTIVE:

Students should be able to use their senses of sight and touch to examine specimens and thus be able to describe the characteristics of the specimens, such as color, texture, and cleavage (the tendency to break in certain definite directions, yielding more or less smooth surfaces).

THE TRIP:

Can you see any signs of soil erosion and rock transportation?
Has any soil been washed away?
Where would this soil have been transported to?
Can rocks also be transported from their original sites?
How? (They can be carried by water, man, etc.)
How do you suppose these rocks got here?
Is there a large rock nearby from which they could have broken off?
(If hand lenses are available they can be used to examine the specimens more carefully.)

Discuss:

The color or colors of the specimen
The shape of the specimen
The origin of the specimen

a. Igneous - solidified molten material
b. Sedimentary - material deposited by water, wind, etc.
c. Metamorphic - produced by the action of heat and pressure on igneous and sedimentary rocks.

Ask:

Are these rocks all the same?
Does your rock have the same mineral all the way through?
Are there large and small crystals in your rock?

Activity:

Choose a rock to study.
Get close to it.
Examine it.
What colors do you see?
Can you identify any of the materials the rock is made of?
How many different minerals do you have in your rock?
How do you suppose these minerals became mixed together like this?
Have you seen this type of mineral before?

ACTIVITY #80 Rocks and Minerals

MATERIALS NEEDED:

Magnifying glasses, penny, pocket knife.

OBJECTIVES:

Students should learn to use their senses of sight and touch to examine rock specimens, and to observe and describe the characteristics of these specimens in terms of color, texture, cleavage, hardness and relative weight. They should learn to observe the environment in which the specimen occurs.

When rock specimens are brought into the classroom, students should use techniques of observation used on the field trip. The child bringing in the specimen should know where he found it and be able to describe the environment to the class.

THE TRIP:

Describe the external characteristics of the rock you have found.

What is its color?
Is it the same color all over?
Is the color solid, or is the rock speckled?
Do you think this is the true color or has something stained the rock? How could you find out the true color?

What is the shape?
Does it have rectangular edges?
Is it rounded? (What may have caused this rounded shape?)
How heavy is it? Is it heavier or lighter than you expected it to be?
How does it compare with a familiar object of the same size, such as a baseball, an egg, an eraser, etc.?
What is the texture: smooth? porous? crumbly? sandy? (What descriptive words can you use?)

How could you get a better idea of the real color and cleavage of this rock? (CAUTION: When breaking open rocks, be sure those taking part have eyes protected with safety goggles.)
Is the rock the same color on the inside as it is on the outside? (If not, why not? Which is the true color of the rock?)
Describe the interior color. Is it one color? Does the color appear in lumps or speckles?
Examine the interior with a hand lens. What do you see?

Do you see any indications of sedimentary formation? What? Describe the texture on the freshly broken surface. Describe the cleavage. Are there any crystals? What shape are they? How many sides does each have?

What is the hardness of this rock? Will it scratch your fingernail? a penny? the blade of the knife? Can it be scratched by your fingernail? the penny? the knife?

How is this rock a part of the total area? Is it part of an outcropping of underlying rock? Are there large boulders like it here? Are there many pieces like it here? Might it have been carried here by a stream? by gravity? by man?
What is this area: a roadside? a part of a farm? the base of a mountain? the floodplain of a stream? Is rock of this type weathering into soil here? (What makes you think so?)

Do you think this rock is composed of only one mineral, or does it seem to contain more than one mineral? Have you tested for only one mineral, or have you carried out your investigations for each of the minerals in the rock?

ACTIVITY #81 Characteristics of Rocks

OBJECTIVES:

Children should be able to:

Use senses of sight and touch in examining rock specimens. Orally describe characteristics of rocks, mentioning facts determined through the senses of sight and touch. Suggest ways rocks may have been carried from place to place.

THE TRIP:

Find a rock. Describe the outside of the rock you found.

What color is it? Is it the same color all over? Is it a solid color or speckled rock? Do you think it is the same color it was years ago?

What is its shape? Is it round, rectangular, or square? Is it shaped like a ball or an egg? Are the edges smooth or sharp?

How heavy is the rock? Is it the weight of a baseball, an egg, or an eraser? Is it too heavy to lift?

Feel your rock. Is it smooth or rough? Is it porous? (Note: This word may have to be defined.) Is it crumbly? Is it sandy? Is it like anything else you have felt?

How do you think the rock came to the place where you found it? Are there larger rocks near this rock?

Does this rock look and feel like the larger rock? Are there other pieces of the larger rock nearby?

Might it have been carried here by a stream? by gravity? by man?

ACTIVITY #82 Soil

MATERIALS NEEDED:

Water; magnifying glass.

OBJECTIVES:

Children should be able to:

List three components of soil.
Describe orally differences in texture, color and water absorptive quality of a variety of soils (at least two varieties after the trip: more, if follow-up activities are used.)
Participate in class studies of soil by bringing in soil samples and/or performing the experiments.
Make "soil" and grow seeds in it.

THE TRIP:

What color do you think soil is?

See what colors of soil you can find in this area. Allow at least 15 minutes for investigations.
What seems to be giving the soil these colors? Of what is soil made? Did you see anything that makes you think this?
(NOTE: If children do not suggest that rock crumbles into soil, ask such questions as: Did you find anything else on the path the same color as the soil? What happens to the stones when you rub them together?)
What causes the rock to break down into soil?
Can you find any rocks which show signs of weathering?
Can you make soil from any of the stones on this path?
(Allow about 15 minutes for experimentation. Safety glasses should be worn if rocks are to be broken.)
How does your soil look compared with what is already here?
How does it feel? Squeeze a handful of your soil and a handful of soil that was already here and seems similar to it.
Compare the texture, the way the squeezed handful holds together.
How would you describe any differences? Look at your hands.
What color are they? Smell the soil you have made. Does it have any odor?

Is there anything in the soil besides pulverized rock? Investigations should not involve tearing up plant roots. Look for areas where the soil is already partially exposed.

Take a handful of soil from near the roots of the grass. Squeeze it, holding your hand near your ear as you do so. Do you hear anything? Describe what you hear. Compare the squeezed sample with yours. Compare the texture of this soil with the soil you made. Smell this soil. How would you describe any odor you notice? Look at the color of your hand. What do you notice? Examine this soil carefully, using a magnifying glass if you have one. Do you see anything in it that was not in yours? What? Look around to see if you can get any idea what this is. Does what you see help explain what you heard and smelled? How?

Spread out several handfuls of this soil and describe all the differences you have noticed in the preceding investigations.

NOTE: If the weather has been dry for a long period of time, it may be necessary to pour a little water on the soils being examined. Even if the soil is moderately moist, if time permits, further observations can be made by pouring water on soil and observing what happens. Was the water absorbed? How quickly? If not, where did it go? What went with it? What color changes took place? What happens now if you squeeze a handful?

If you were going to make the very best possible soil you could make, what would you put in it?

Of what value are the rock particles in soil?

Of what value are the plant particles?

Of what value are the animals?

To whom are these things valuable?

ACTIVITY #83 Erosion (Rainy Day)

OBJECTIVES:

When asked to write a paragraph about erosion, the student should be able to:

Describe three factors contributing to erosion control.
Suggest at least two methods of erosion control.

THE TRIP:

Look at a grassy hillside or any sloping piece of ground. Can you see any water running over the soil? Where do you see water? Where is this water going? Compare an open piece of soil with one covered with grass or other plants. Is the run-off from these areas different?
How does the contour of the land affect the run-off pattern of the water?
Trace the flow of surface water to its source.
What path does it follow?
What factors will affect the speed of the water run-off?
Which areas do you think are damaged the most by erosion?

What natural methods of erosion control do you see? What artificial (man-made) methods of erosion control do you see? What would happen to this area in a rainstorm if all plants and trees were suddenly removed? What makes you think this? Have you observed examples of this or have you learned of this through reading or hearsay?

ACTIVITY #85 Shapes and Patterns

NATERIALS NEEDED:

Pencil and paper

OBJECTIVES:

Given a set of articles in a natural environment, students should be able to list them in order of relative size, from the largest to the smallest.

Students should be able to find leaves with at least three different shapes and be able to sketch shapes seen in flowers, trees, clouds, and other natural phenomena.

THE TRIP:

What shapes can you see? Are all trees shaped the same? Sketch a few. What shape is a leaf? Trace at least three leaf outlines. What shape is a flower? Can you find one that is bell-shaped, triangular, round? What shape is a cloud? Try to sketch some. What happens to the clouds as you draw? Can you find the shape of a triangle, a rectangle, a square, a circle, etc. in what you see?

What sizes can you see? List some things you can see starting with the biggest thing and getting smaller until you reach the smallest thing you can find. What kinds of things can you see that can be both big and little?

What patterns can you see? Sketch some. Can you find patterns in the bark of trees? Can you see patterns in plants, birds, insects and other animals?

Can you find a tree that reminds you of a figure, a vase, etc.?

Can you find a texture in some natural object that you would like in cloth? What would you make from such cloth?

ACTIVITY #86 Symmetry

MATERIALS NEEDED:

Onionskin paper, clipboard, crayons, leaves.

OBJECTIVES:

Children, after observations on a field trip, should be able to:

Note the balance or symmetry that is found in leaves and in nature.
Describe man's use of symmetry in design.

THE TRIP:

Observe a leaf. Is it symmetrical (with equal or balanced portions)? Discuss symmetry and again observe the leaf carefully. Is the total shape symmetrical? Is the vein arrangement symmetrical?

Ask students to recall other examples of symmetry and look for examples in butterflies, birds, people, grass blades, etc.

Divide class into groups of four or six students, each student using onionskin paper, clipboard and crayon. Lay the paper over a leaf with the clipboard under the leaf. While a classmate holds the clipboard and paper, crayon over leaf to transfer shape and vein arrangement to paper. On the same paper put other leaves that are symmetrical.

Another page may be made of non-symmetrical shapes.

Observe: On trees having symmetrical leaves, are all the leaves exactly the same shape? Did you find some leaves that are normally symmetrical which were altered in some way? What do you think changed this? (Insects, weather, man, sun)
Can you find lop-sided leaves?
From a distance, does the total outline of the tree look symmetrical? Stand underneath and observe the branches. Are they evenly balanced?

ACTIVITY #87 Observing with Senses

MATERIALS NEEDED:

Hand lens

OBJECTIVES:

After this activity, given an object or objects, the student should be able to:

Draw the general outline of objects observed.
Describe the texture and the quality of the object using a list of adjectives.
List at least three colors found in the object. (The number may vary depending on the object.)
Describe the parts or units which make up the object.
Describe briefly the steps and senses used in the processes of observation.
Write a description of the object which, when read to the class, sufficiently describes the object so that others can guess, with no more than three guesses, what it is.

THE TRIP:

Locate an object.
Pick it up if you can. Is it heavy or light? Compare its weight to something you know.
Is it wet or dry, firm or pliable, soft or hard? Do you think it would break or bend if you dropped it? (Don't drop it until after you have finished examining it.)
How would you describe the shape of the object? Compare it to something you know.
Describe the texture of the object. How does it feel?
Does it feel the same all over or do some parts feel different?
Sniff it. Is there a distinctive odor? Can you describe it?
What color is it? Compare its color to something more familiar.
Is it all the same color or does the color differ from one part to another? If so, describe the variations.

Look at it closely. How does one part differ from another? Are there holes in it? Are they many, few, big, little? Are there any other fine details?
Is the object all one piece, or is it made up of smaller units? Are they regular? Can you count them?
Might this be a part of a larger thing? Check the area for other things possibly related to it.
What importance might it have for some plant or animal in the area?

ACTIVITY #88 Man and His World

OBJECTIVES:

The student should be able to list two changes that man makes in his environment for each of the following needs;

Food, shelter, clothing, warmth, transportation, and pleasure.

THE TRIP:

How can you tell that man has changed the landscape? (Kinds of trees, number of trees, arrangement of trees, etc.) If the land went untouched, how might a grassy field look after one year? five years? fifty years? Could you predict which of the original plants would continue to reproduce themselves? What information could be used as a basis for such predictions?

Would a slope facing south have the same vegetation as a slope facing north? Would the vegetation along a creek be the same as that on hillsides? How can you find out?

Can you find plants growing in the area that were probably planted deliberately? How did the others get there?

Are the changes man has made here good or bad? From whose point of view? What are some reasons that man makes changes in his environment? Do any other animals change the environment? How? Why?

What changes does a farmer make in the environment to grow wheat, corn, or other food crops? How do these changes affect the animals native to the area?

What changes would a farmer make in the environment to raise cattle or sheep? How would these changes affect native plants and animals?

What does man take from nature to supply himself with clothing, warmth, shelter, transportation, and pleasure?
How are these things returned to the environment to insure a continuing supply? Can they all be returned?

What value is there in a park or wilderness area besides providing a pretty place to visit? (The values will vary according to the type of area. Swamps and marshes provide natural flood control and water storage as well as nesting areas for birds. Wooded areas provide good "air conditioning" in the summer through evaporation, give food and shelter to birds who eat many insects unappreciated by humans, etc. Try to follow each of these values back far enough to show the direct or indirect benefit to man. Though he can use his environment for his own purposes, abuse of it will eventually harm him, since he is himself a part of the ecosystem.)

FOLLOW-UP MASTER KEY
LEVEL II

Page	Title	Level K	1	2	3	4	5	6	Season*	Activity
Seasonal Follow-Up Activities										
FLP# 1 1f	A DIARY OF AUTUMN			x	x	x			F	1,2,6
FLP# 3 3f	SIGNS OF SPRING IN THE FALL			x	x	x			F	3,16,32
FLP# 5 6f	WINTER COLOR			x	x	x			W	8
FLP# 6 7f	SNOW STUDIES			x	x	x	x	x	W	7,9
FLP# 8 10f	FEEDERS TO MAKE	x	x	x	x	x	x	x	F,W	4,7,9,10
FLP# 9 11f	TREE BUDS					x	x	x	Sp	16,29,31
FLP#10 12f	SPRING FLOWERS I			x	x	x	x	x	Sp	19,30
FLP#11 13f	SPRING FLOWERS II			x	x	x	x	x	Sp	19,30
FLP#12 15f	BLUEBIRD HOUSE			x	x	x	x	x	All	17
FLP#13 16f	DESCRIPTIONS	x	x	x	x	x			All	12,13,59
Flora										
FLP#14 17f	FUNGI		x	x	x	x			F	24
FLP#15 18f	SPORE PRINTING			x	x	x	x	x	F	23,24
FLP#18 21f	DECOMPOSERS IN A TERRARIUM					x	x	x	F,Su	24
FLP#23 31f	NAME THESE POISONOUS PLANTS						x	x	All	
						x	x	x	All	27
FLP#24 32f	BUDS			x	x	x	x	x	W,Sp	21,31
FLP#26 34f	LEAF OUTLINES	x	x	x	x	x			F,Su	1,6,28,33,34
FLP#27 36f	VENATION	x	x	x	x	x			F,Su	1,6,28,34,86
FLP#31 41f	CINQUAIN			x	x	x			All	35
Fauna										
FLP#34 44f	INSECTS AT HOME					x	x	x	All	40,41
FLP#35 46f	INSECTS AND TEMPERATURE				x	x	x		F	38,40,41
FLP#36 47f	ANT FARM					x	x	x	F,Sp	39
FLP#37 48f	HOW TO SET UP AN ANT FARM AND STUDY					x	x	x	F,Sp	39
FLP#41 55f	WHO GOES THERE?			x	x	x			All	12,44,53
FLP#44 59f	ANIMAL HOMES	x	x	x	x	x			F,Sp,Su	12,44,45
FLP#45 60f	BIRDS	x	x	x	x	x			All	10,48
FLP#46 61f	SPRING BIRDS			x	x	x	x	x	Sp, Su	17,49

LEVEL II
FOLLOW-UP ACTIVITY
MASTER KEY cont.

	Page	Title	Level K	1	2	3	4	5	6	Season	Activity
Fauna											
FLP#47	62f	BIRDS IN HABITATS--------						x	x	F,Sp,Su	4,51
FLP#49	64f	BIRD IDENTIFICATION------			x	x	x	x	x	All	10,17,50,52
FLP#52	67f	BEAKS AND FEET----------			x	x	x	x	x	All	10,50,52
FLP#53	68f	MARSH OR STREAM ORGANISMS			x	x	x	x	x	All	64,65,68-72
Habitat Studies											
FLP#54	74f	HABITATS----------					x	x	x	All	58,62
FLP#55	75f	RAISING TADPOLES---------				x	x			F,Sp,Su	22,34,60
FLP#56	76f	FALLEN TREE----------	x	x	x	x	x			F,Sp,Su	22,34,60
FLP#57	77f	OBSERVATIONS,INFERENCES: Woods, Trees----------					x	x	x	All	88
FLP#58	79f	SURFACE TENSION----------					x	x	x	All	65,72,84
FLP#59	80f	MEADOW FOOD CHAIN--------	x	x	x	x				F,Sp, Su	5
FLP#60	81f	FOREST FOOD CHAIN--------	x	x	x	x				F,Su	57
FLP#61	82f	AQUATIC FOOD CHAIN-------	x	x	x	x				All	57,68
FLP#62	83f	MARSH FOOD CHAIN--------					x	x	x	All	57,68,71
FLP#63	84f	POND DATA SHEET----------				x	x	x	x	All	67
FLP#65	87 f	POND SUCCESSION----------					x	x	x	All	66
FLP#66	88f	POND WATER----------					x	x	x	All	66
Weather, Geology, Soils, Hydrography											
FLP#67	89f	AFTER THE RAIN----------	x	x	x	x				F,Sp,Su	73,74,77,82
FLP#68	92f	WIND----------	x	x	x	x	x	x	x	All	75,76,78
FLP#70	95f	BERLESE FUNNEL----------	x	x	x	x	x	x	x	F,Sp,Su	55,82
FLP#73	98f	ROCKS AND MINERALS------				x	x	x	x	All	79,80
Awareness, Man and Nature											
FLP#75	101f	USING YOUR SENSES------	x	x	x	x	x			All	13,14,15,87
FLP#76	102f	OBSERVATION LOTTO------				x	x			All	88
FLP#77	103f	ANY BUS TRIP----------	x	x	x	x	x			All	54,85
FLP#79	105f	ON THE BUS----------				x	x	x		All	88
FLP#81	107f	FEELINGS IN THE FOREST-				x	x	x	x	All	36,61
FLP#82	109f	DROP COOKIES----------					x	x	x	All	88

* F=fall, W=winter, Sp=spring, Su=summer, All=all seasons

FOLLOW-UP # 1 A Diary of Autumn

When do leaves turn color? When do they fall? What colors do they turn? Keep a record of autumn in your neighborhood. Record for each tree the dates when the first and last leaves fall. Try to match their colors with your crayons. Note any other facts you think important, such as temperature and location.

TREE: TREE: TREE:

Date first leaves fell
Date last leaves fell

TREE: TREE: TREE:

TREE: TREE: TREE:

TREE: TREE: TREE:

FOLLOW-UP #3 Signs of Spring in the Fall

The dogwood flower bud has an "onion" shape. Can you find one? [Note: The dogwood buds containing leaves are not bulbous as are the flower buds but are narrow and pointed.]
What bud could be called "praying hands"?
Can you make up names for the others?
Can you find some of these buds?
Can you find others and sketch them?
How can you describe them? Rough? Smooth? Hairy?

ASH

BEECH

BLACK OAK

BLACK WALNUT

ELM

HORSE CHESTNUT

PUSSY WILLOW

MAPLE

SHAGBARK HICKORY

SYCAMORE

TULIP

DOGWOOD

FOLLOW-UP #5 Winter Color

On the bus

Watch for colors from the bus windows.
Can you pick out groups of red maples? beech trees?

Divide the class into two groups and keep score of colors seen:

1 point grey
1 point brown
1 point black
2 points green
3 points red
4 points blue
5 points yellow

Objects must be natural objects, not houses, cars, not peoples' clothing.

In the classroom or at home

Bring samples of paint (from advertising cards available at paint stores), department store ads with color samples, etc. From them select colors seen in the out-of-doors. Make a winter collage by pasting these (and other items of appropriate color) onto a piece of cardboard.

Experiment with mixing white with other poster-paint colors to match colors seen outdoors. Paint a picture of the place you visited on the field trip.

Research winter color changes in animals, such as the starling, snowshoe rabbit, ermine.

Adopt a tree or shrub near your home or school and keep a pictorial record of it for the rest of the winter, into spring. How does the color change?

If you pressed leaves last fall, examine them now. How do the colors compare with the colors when you collected them?

Further Field Trips

Visit the same area in the spring and look for color changes.

FOLLOW-UP # 6 Snow Studies

I. Snow - (Observation and science activities)
   1. Let snow flakes fall on black paper; look at various shapes with a magnifying glass.
   2. Put a can outside to catch snow. Measure height of snow in can, bring in and let melt; then remeasure.
   3. Make a footprint in the morning, measure; measure it again at the end of the school day.
   4. Go out and make observations about depth of snow, melting pattern, drifting pattern.
   5. Put water from faucet into cup, place outside with a thermometer. Note temperature and time it takes to freeze.

II. Snow (Art)
   1. Make a snow flake from cut paper.
   2. Draw a winter scene with chalk or crayons, then use white tempera to add snow where children have observed snow accumulates.
   3. Make a booklet of winter observations, birds, bare trees, brown grass.
   4. Make soap suds pictures (Ivory Flakes & water).
   5. Create snow bulletin boards.

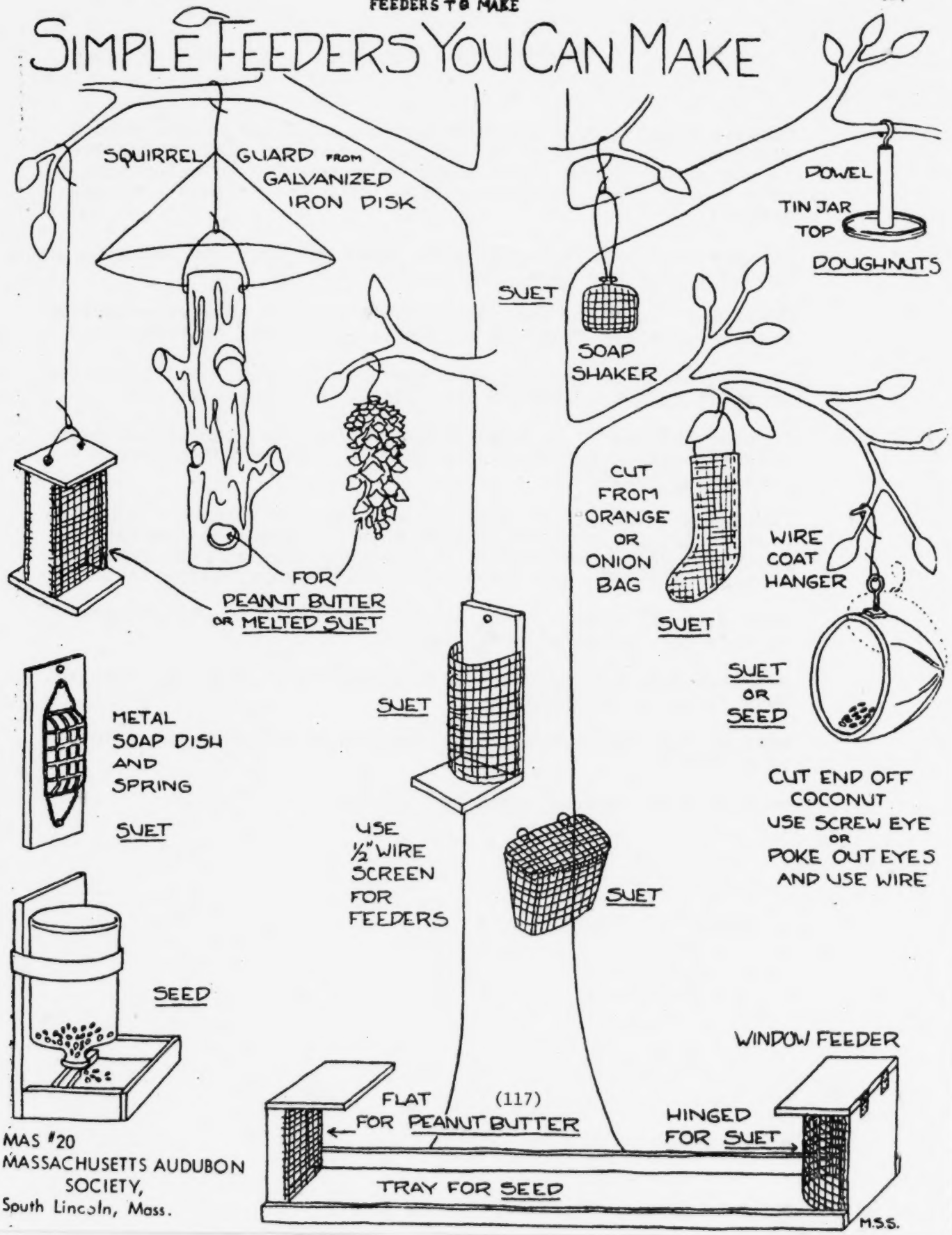
III. Snow (Language arts)
   1. Write stories about
      How snow feels
      How snow looks
   2. Keep a chart or booklet about all information discovered in observations of snow.
      How often it snows
      What is snow
      Characteristics of snow
   3. Make a snow dictionary - Water vapor, drift, flake, melt, cloud, freezing, temperature, thermometer, ice.

IV. Winter
   1. Start in the fall and draw attention to two trees, one evergreen, one deciduous. Draw pictures of the trees each month. Write a story about weather and observations of trees. (You can do this with bushes or grasses. Add to the booklet each month as a diary of seasonal observations.)

2. Make trips in schoolyard and neighborhood and find signs of winter.
3. Dig up piece of soil and plant it (soil that looks bare).
4. Plant an abandoned bird nest (seeds in grassy nest will grow).
5. Observe winter birds and help a class or individual record.
6. Make bird houses and put out winter feed. Observe and record.
7. Measure shadows of children at same time of day in same place at the beginning of each month.
8. Keep a dictionary of winter words - hibernation, migration, cold, freeze, etc.
9. Make a bulletin board of ground, trees, bushes, sky. Place pictures of hibernating animals and insects. Cover animals and make a lift up panel to discover animals beneath. Label spots so children can identify words with animals.
10. Make up poems, stories, and songs about winter.

FEEDERS TO MAKE

SIMPLE FEEDERS YOU CAN MAKE



MAS #20
MASSACHUSETTS AUDUBON SOCIETY,
South Lincoln, Mass.

FOLLOW-UP #9 Tree Buds

Observe opening buds on trees and other plants around school and home. Keep a diary of opening dates for various species. (A 5th or 6th grade class might be interested in being part of a 5-year study of opening dates with temperature correlations.)

Compare leaf and flower buds on trees, shrubs, and herbaceous plants around school and home. Which open first?

Research: Is there any relationship between the dates various species of trees leaf out and their geographic distribution?

Experiment: Try forcing some branches indoors. Which has the greatest effect: temperature, light, or other factors?

Compare "halves". Is there a higher rate of symmetry amongst leaves which emerge folded in half or leaves which emerge pleated or curled?

Packaging: Experiment with various ways of folding a tissue, silk scarf, or paper to pack it into the smallest "envelope". [Note: young leaves emerge as minature leaves. Following subsequent growth and development they become mature leaves.]

With a razor, take a cross section of various types of buds to view the "packing" arrangements.

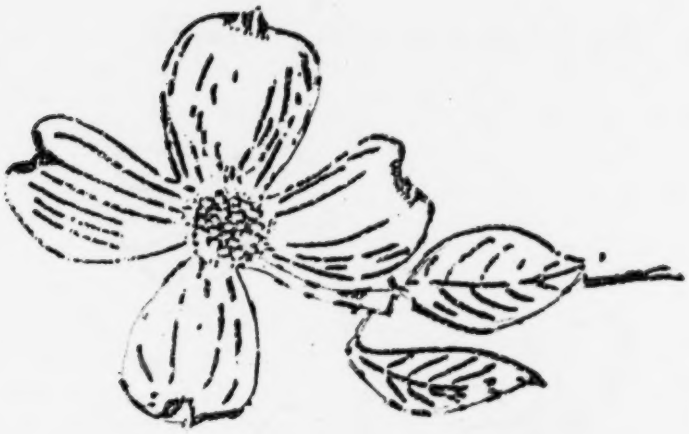
Research and further outdoor investigation: What are bracts? What is their function?

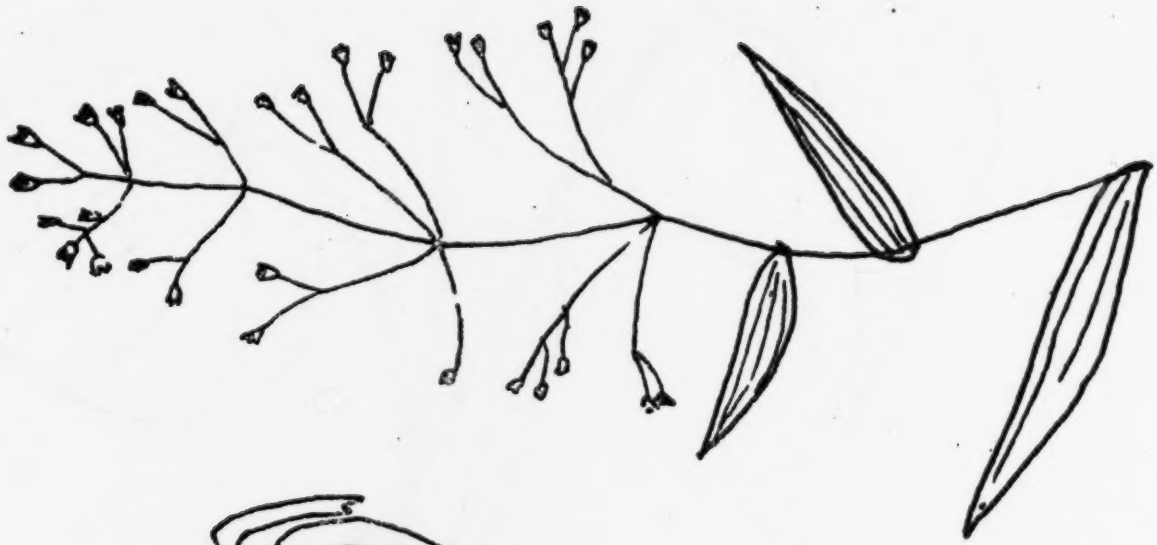
Make designs using the leaf arrangements noted on the trip (and since).

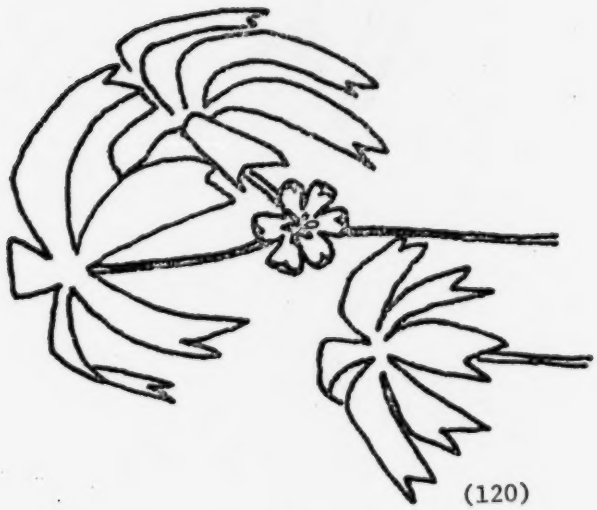
When do buds form on trees and shrubs?

FOLLOW-UP #10 Spring Flowers

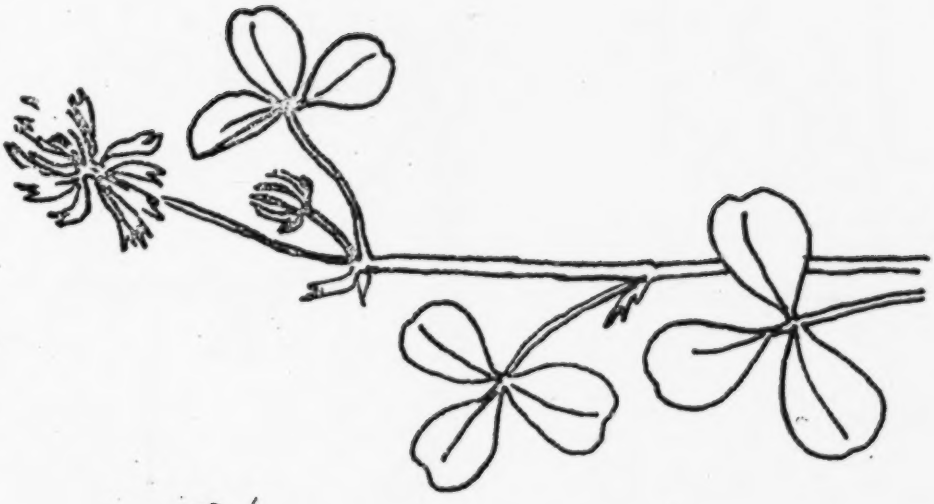
FOLLOW-UP #11 Spring Flowers 'f

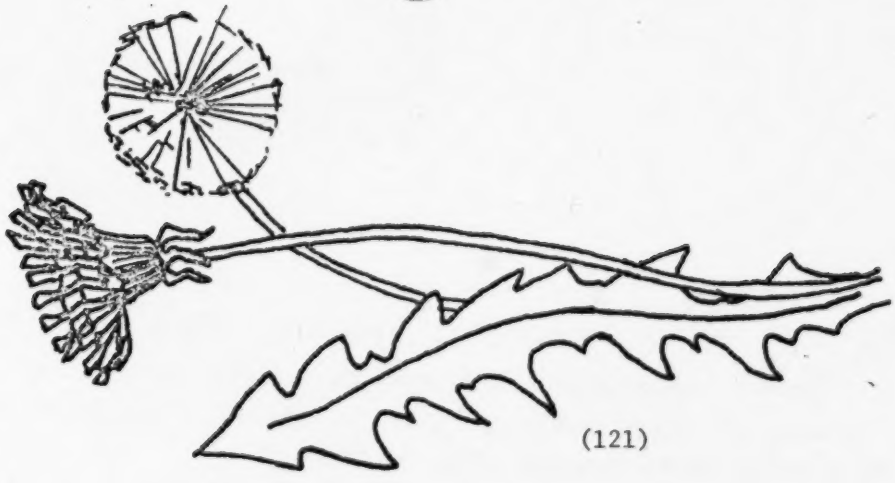






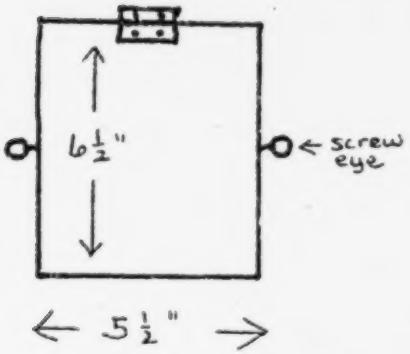
FOLLOW-UP #11 (continued)



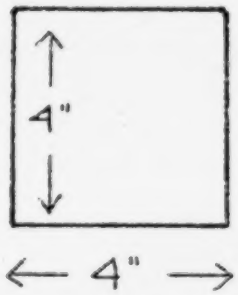


Plans for a Bluebird House

Be sure to follow measurements exactly.



Top



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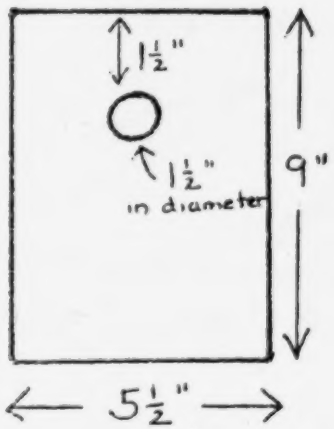
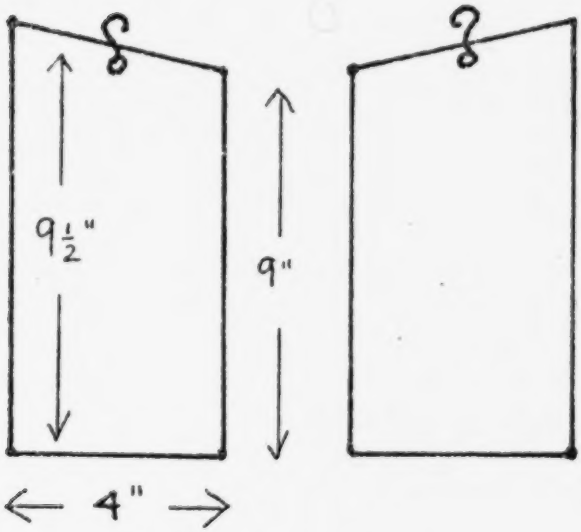
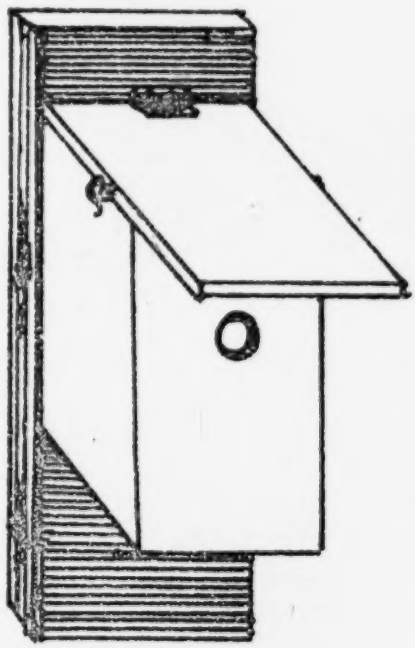
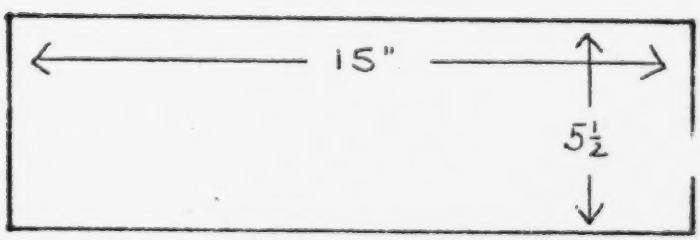


Front



Sides





Back

Wood should be ¾" – 1" thick, with no cracks. Use 1½" long screws, not nails. Paint outsides and edges with brown or grey wood stain. A hinged top allows you to clean it out at the end of the season. (You may also hinge the bottom.)

Nail to a tree trunk or fence post 6-10" above ground, and facing an open space. The box should be shaded during the hot part of the day.

From All About Birds by Robert Lemon
Random House, N.Y. 1955

FOLLOW-UP # 13 Descriptions

Write a group story using as many descriptive words as possible to describe

smells
colors
textures
sizes

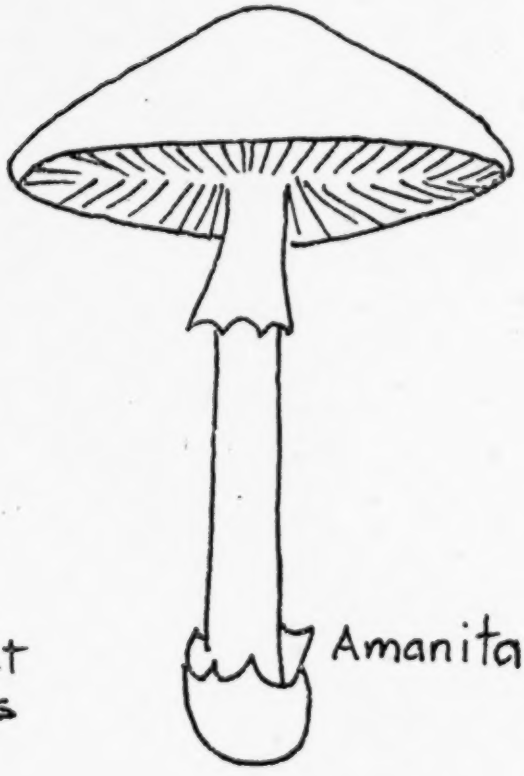
Example: We went on a field trip.
We saw big trees
tall trees
short trees
green trees
brown trees
wide trees
thin trees

The kinds of bark on the trees were different.
Some bark was smooth
rough
bumpy
lumpy

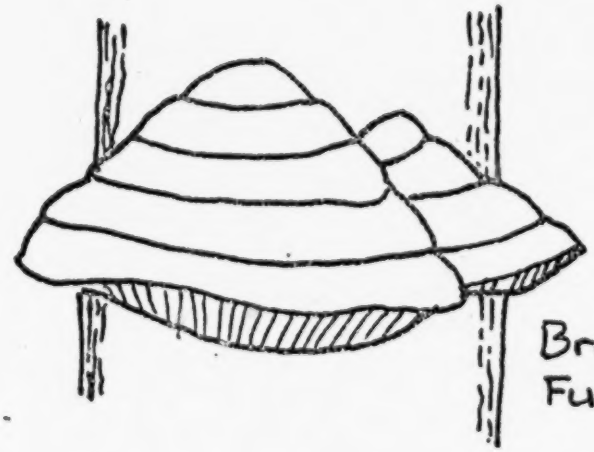
Locate fungi that resemble those pictured below:

Morel

Puffball



Amanita



Bracket Fungus

FOLLOW-UP # 15 "Spore Printing" *

This is a very different kind of printing. Spread a thick coat of half-mucilage-half-water mixture (or slightly beaten egg white) onto a piece of thin cardboard. Cut off the stem of a mature, fully-opened mushroom directly under the cap. Place the cap, bottom down, in the middle of the cardboard. Cover the layout with a turned-over dish, and leave undisturbed for 24 hours. Take the dish off and air dry.

* Copied from A Leader's Guide to Nature-Oriented Activities by Betty Van Der Smissen and Oswald H. Goering, Iowa State University Press, Ames, Iowa, p. 60.

FOLLOW-UP #18 Decomposers in a Terrarium

In the classroom or at home: (Note: Most of these are long-term projects.)

Find examples of decomposition in the school yard and at home. (Can you find any in the classroom?) Does decomposition continue if the object is brought into the classroom? What factors hasten decomposition?

Set up a "fungarium". How many different kinds of fungi can you succeed in raising? On what materials will they grow?

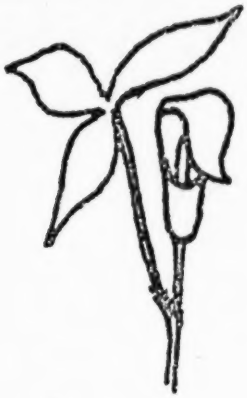
Set up a terrarium with "Betsy beetles" (also known as patent leather beetles, horn bugs or peg bugs). Spread the floor of the terrarium with a sprinkling of charcoal, sand, pebbles and potting soil. Lay loosely a large quantity of rotting wood on top of this. "Betsy beetles" may be found in most rotting logs. Keep the terrarium just moist enough to maintain some moss or a fern, but not wet enough for mold to grow. Keep top covered with glass or plastic, and shield the top and sides from direct light. What do the beetles eat? How do they feed their young? What sound do they make, and how? Can you discover why? What does their home look like? Are they harmful or beneficial insects? What is their place in the forest?

What is a compost pile? If your family does not have one, perhaps your parents will help you get one started. What reasons could you give them for having one?

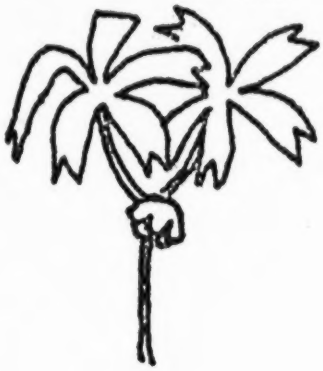
What decomposers are there that you can't see? Sprinkle particles of decaying wood on the surface of the agar in several sterile agar plates. One plate should contain only agar to act as a "control". Keep the plates in a warm (72° F.) dark place for several days. What do you see on the plates? (Directions for preparing agar are in Follow-Up Activity #17.)

FOLLOW-UP #23 Name These Poisonous Plants

1. J



2. J

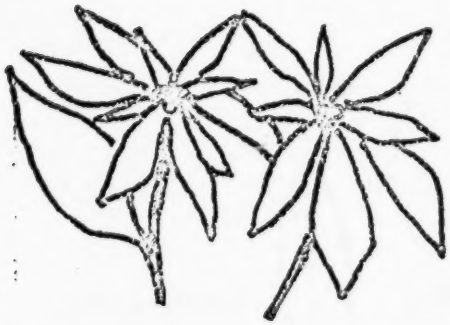


3. M

4. N

5. Y

6. F



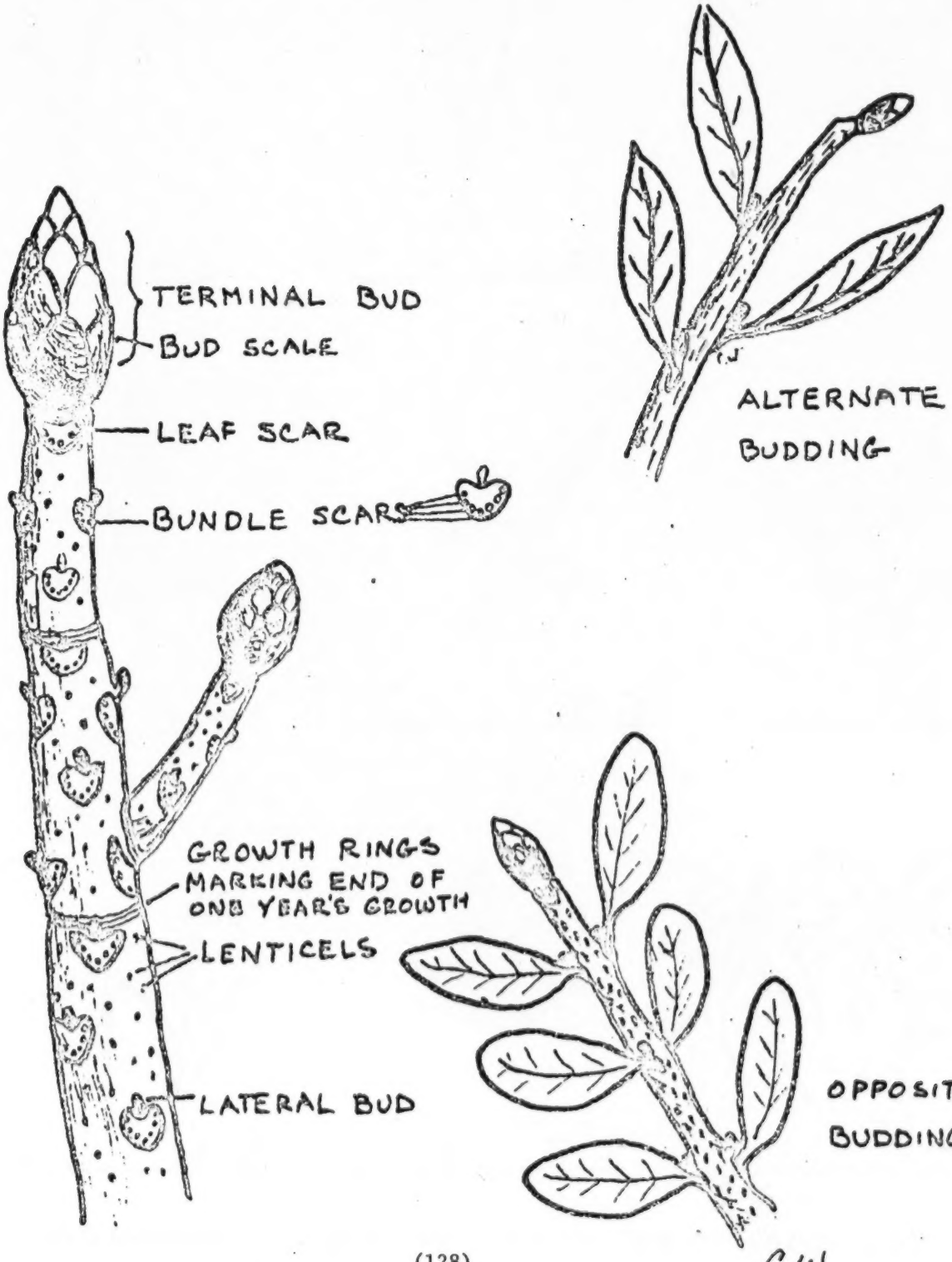
7. P

8. P H

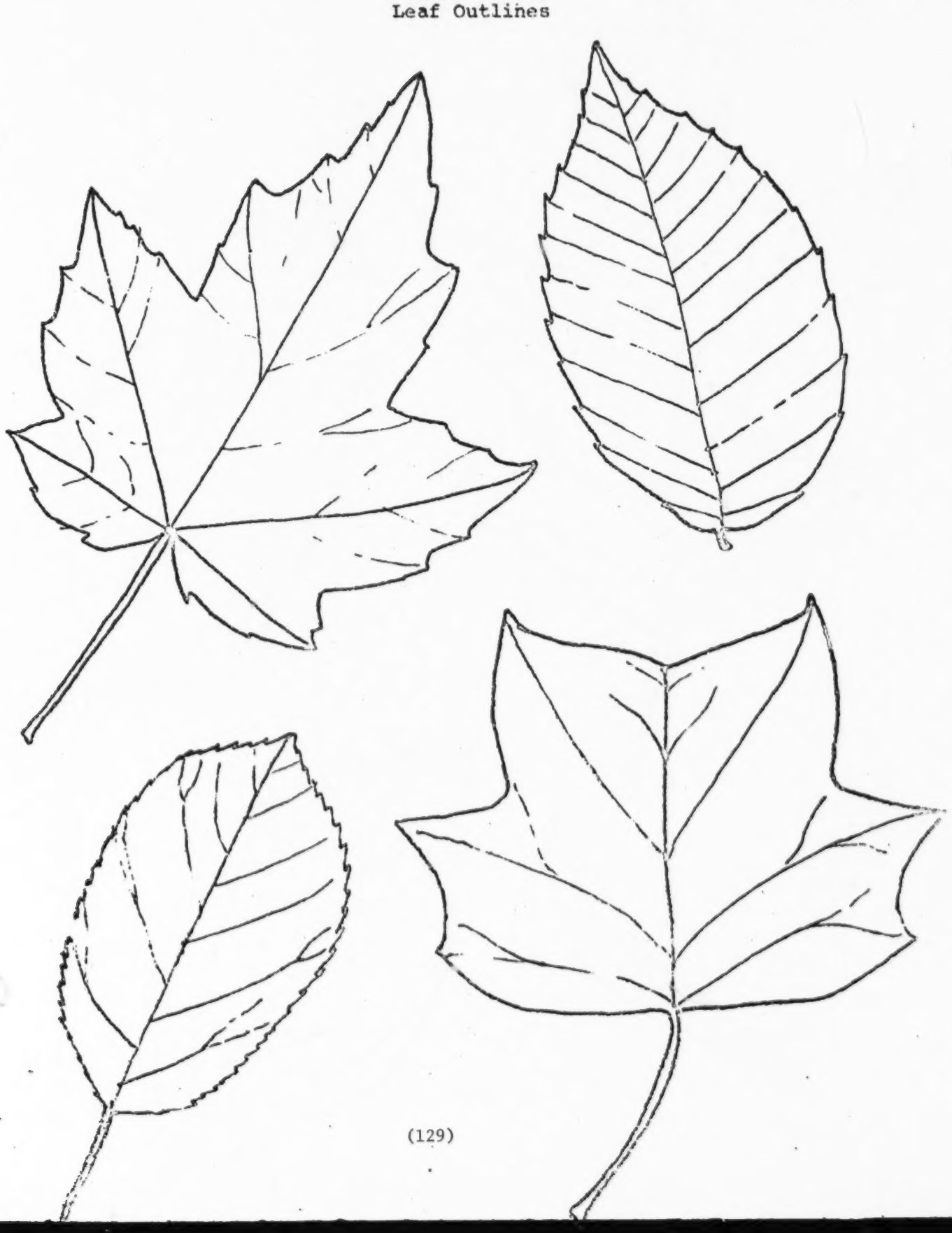
9. L

DO YOU KNOW THE NAMES OF THESE POISONOUS PLANTS? THE FIRST LETTER OF EACH IS GIVEN.

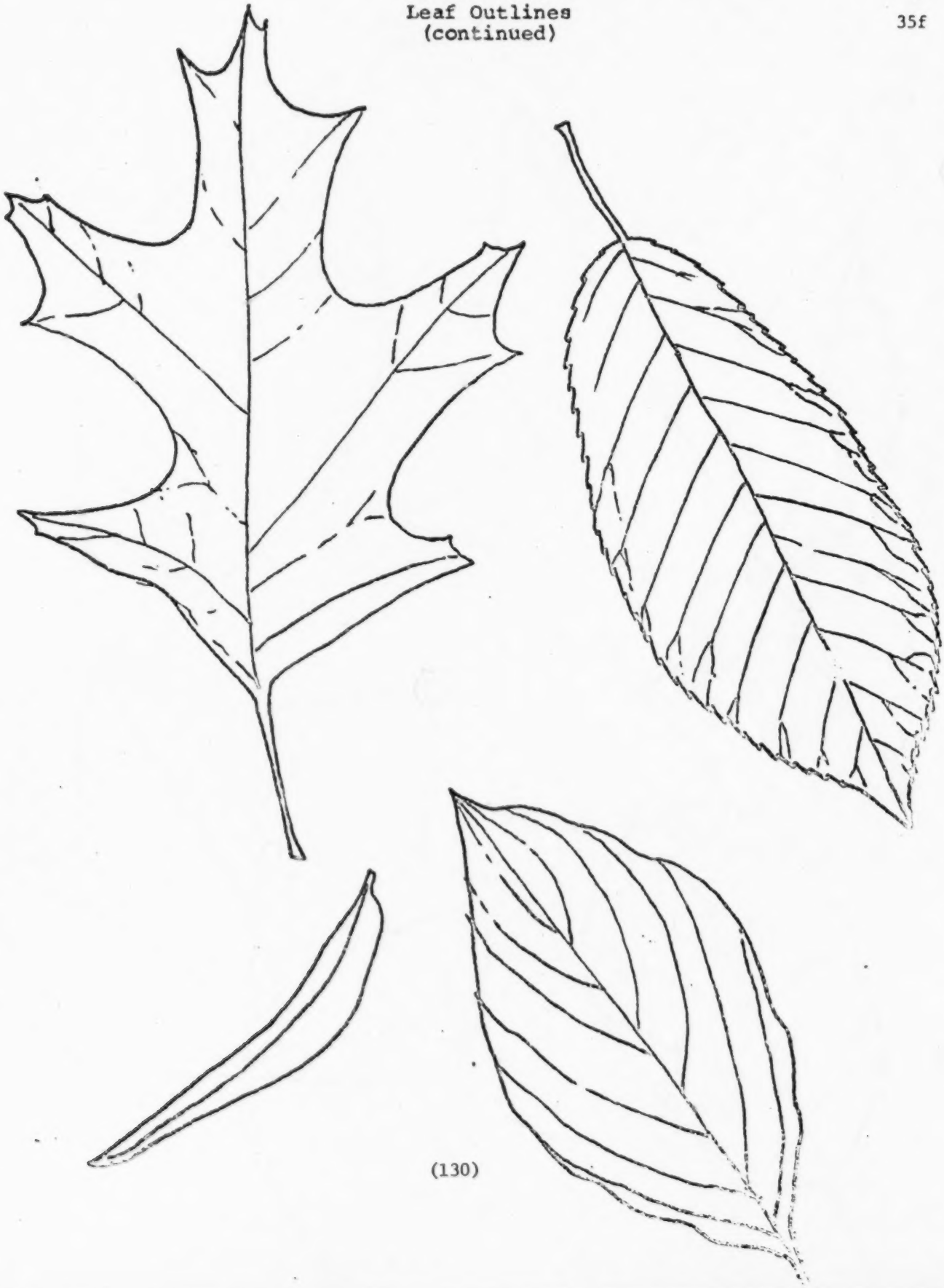
L. BERG

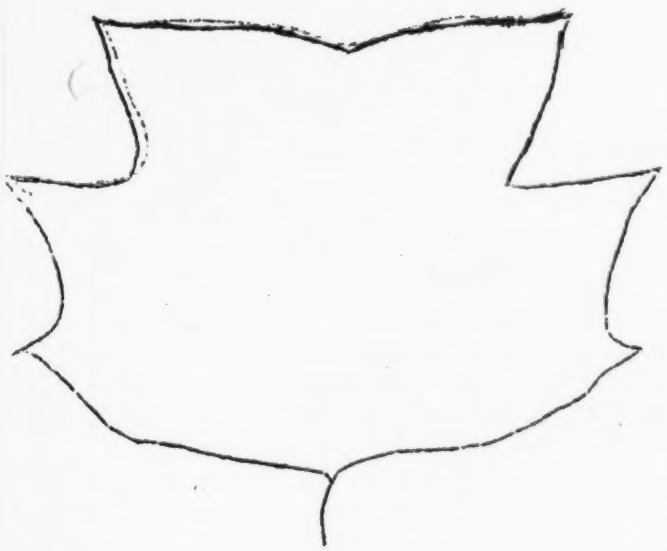

TERMINAL BUD
BUD SCALE
LEAF SCAR
BUNDLE SCARS
GROWTH RINGS MARKING END OF ONE YEAR'S GROWTH
LENTICELS
LATERAL BUD
ALTERNATE BUDDING
OPPOSITE BUDDING
CW

FOLLOW-UP #26
Leaf Outlines



FOLLOW-UP #26
Leaf Outlines
(continued)





Find a leaf like this TULIP TREE leaf and draw in the veins.

Find a leaf like this BEECH TREE leaf and draw in the veins.

Find a leaf like this SASSAFRAS TREE leaf and draw in the veins. (131) Are all the leaves on this tree the same shape?

Find a leaf like this PIN OAK TREE leaf and draw in the veins.

- N. Heule -

FOLLOW-UP #31 Cinquain

Write a "Cinquain" by following the formula.

Formula	Example
1. Name it ----------	Flower
2. Two describing words ----------	White, free
3. Action phrase (3 words)----------	Floats on ponds
4. Four words telling what it means to you---	A beauty to see
5. Rename it----------	Lily

Flower
White, free
Floats on ponds
A beauty to see
Lily

FOLLOW-UP #34 Insects at Home

Make an insect cage and observe insects, a few at a time, for several days.

Make up some problems based on crickets and temperature. Can your classmates solve them?

Observe insects in their natural surroundings in your yard, the school yard, and any other place you might find them.

Take a walk around your neighborhood at night. How many different insect sounds can you hear? If you take a flashlight with you, you may be able to track down one of the sounds and find the insect making it. (Watch out for the neighbor's flower bed!)

While insect-walking in your neighborhood, notice whether you hear more sounds as you pass a wide lawn, or as you approach shrubbery. Where would you expect to hear more sounds? Why?

If you can walk through or by a field, and through or by a woods, you can compare the insect sounds you hear in both places. You can also compare them with the ones you heard in your neighborhood. Would you expect to hear the same ones?

If you have a portable tape recorder, you can tape-record the insects you hear at night and play the recording at school. Perhaps your classmates would like to make up some imaginary insects that made the sounds. Of course, you'll want to make up names for them!

What is a "bug light"? Are insects attracted to certain color lights? Set up an experiment to find out. Be sure lights are the same wattage. Put a glass collecting jar with a funnel in it beneath each light.

At what times of day are insects most evident by sound? by sight? Atwhat temperatures are they most observably active?

At what time in the evening do you first begin to hear the insect chorus? Keep a record for several weeks. What factors seem to influence their activity?

What insects remain active latest in the fall? Can you set up a record sheet on which to record activity, temperature, and dates?

Where do the insects go in winter? Can you find examples of insects which migrate? hibernate? which survive only in the eggs of their young? Do any insects remain active in winter?

During late fall or winter investigate possible hibernation hide-aways. Take the temperature in likely locations, such as under logs, under the loose bark of trees, in crevices in the bark, behind shutters on your house. Where else? What do you find about these temperatures as compared to temperatures of the air?

Can you find out if male and female insects are colored differently? are of different sizes?

Questions for Research:

What insects spend part of their lives in the soil?

Do wasps gather honey?

How do insect wings differ from bird wings? Are airplanes patterned more after birds or insects?

How does an insect fly?

How does a firefly light? Does light, temperature, or some other factor influence the firefly's activity?

What other forms of life would be affected if we invented a chemical that killed all the insects?

FOLLOW-UP #35 Insect Calendar

On this calendar, keep a record of the insects you hear this fall. You can use a symbol or abbreviation for each, such as CR for cricket, K for katydid, M for mosquito, etc. Show daily temperature extremes.

FOLLOW-UP #36 Ant Farm

You can buy a plastic "ant farm" ant house, or make your own. (See Follow Up #37).
Early spring and fall are the best times to start an indoor colony. Be sure to collect the queen ant. (Why?) She is at least twice as large as the worker ants.
After locating an ant hill, lift the earth cover with a shovel and set it aside.

Transfer the ants and earth to a bucket.
Restore the nest as much as you can.

To transfer your ants from the bucket to the "ant farm", spread newspapers on a level surface.
Spread small quantities of earth onto the newspapers and transfer the ants from it to the ant house.
Don't overcrowd your nest: about 50 ants will be enough.

If the ants are too active for easy handling, you can refrigerate them for a while.
Keep the nest at 70-80°F.
Keep the soil moist.

Should you keep the ants in a well lighted place, or in the dark? Why? What happens when there are changes in temperature?

What kinds of soil do ants use in their nests?
What happens if you put different kinds of soil in the different sections of the nest?

Feeding:
Syrup or dissolved sugar in water will substitute for what natural foods?
Ants need protein! During the winter a good diet can be made from the following recipe:

> To a small amount of egg white, add the same amount of vegetable oil, the same amount of syrup, and twice the amount of water.
> Stir well.
> Store in refrigerator.

During spring, summer, and early fall, you may be able to make observations of what the ants of this colony ate at the home site.

Do you think ants are beneficial or harmful insects? Why?

FOLLOW-UP ACTIVITY #37
How to Set up an Ant Colony for Study

Get several wide-mouthed jars, with tops; a large sheet of white paper; bags or bucket for earth; spoons; trowel or spade.

After locating colony, work quickly. With spoons, scoop cocoons and larvae into one of the jars, workers and guards into another, and queens into another. Don't overlook the workers that return to the colony while you are digging! Beware of crowding - about 15 ants per jar is the limit.

Lay paper beside the colony, and scoop dirt onto it. Put some of the dirt into the bucket, and put some of it with 1 queen and some workers back into the colony site. Replace any stone or log moved.

Put leaves, grass, and damp earth into jars with the ants.

Collect any bugs, aphids, beetles, or other small insects found in the ant colony. Put them in another jar.

Have prepared indoors a large jar with a flat-bottomed rock that will fit into it. You will also need 2 small moistened sponges, a cheesecloth to cover the jar, and string or a rubber band to hold it in place. Using plaster of paris, construct straight-sided walls (smoothed so the ants can't climb them) around the edges of a large board (about 16 inches square).

Fill the large jar with earth from the colony up to about 2 inches from the top. Place rock on top of dirt, against one side, and put sponges inside. Place the large jar inside the plaster of paris walls.

Turn workers out into yard (inside walls) with cocoons, larvae and eggs. When they have found the earth inside the large jar, watch them build the new nest. By the next day put the remaining ants and bugs into the yard.

The earth in the jar must be kept moist but not wet. Keep the drinking sponges wet, and feed the ants regularly.

When you have finished your observations, return ants and earth to their original site.

THINGS TO OBSERVE

How long does it take an ant egg to hatch? How long does the ant spend in the larval and pupal forms?

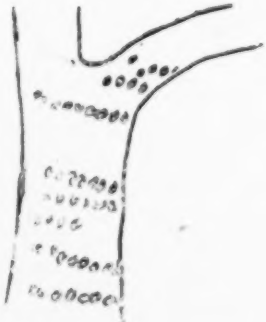
How can you tell an ant egg from a cocoon?

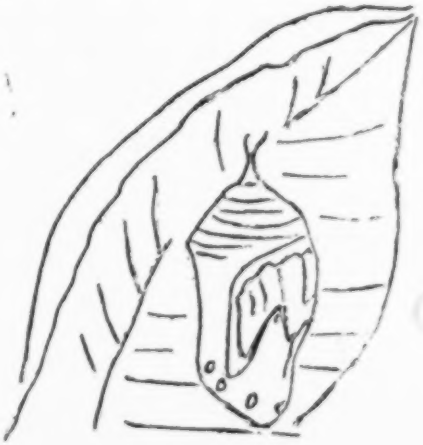
FOLLOW-UP # 41

WHO GOES THERE ?

Can you match these signs to the animals that made them?

monarch butterfly	raccoon	squirrel
white-tailed deer	rabbit	woodpecker
leaf-cutter bee	cat	deer-nibbled twig
pheasant	bird	rabbit-nibbled twig





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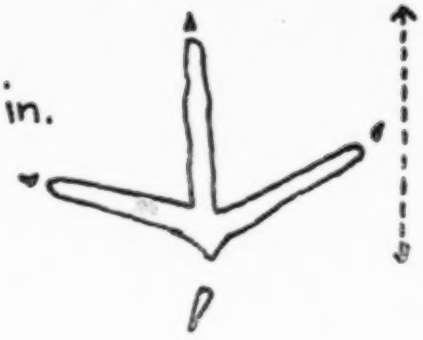
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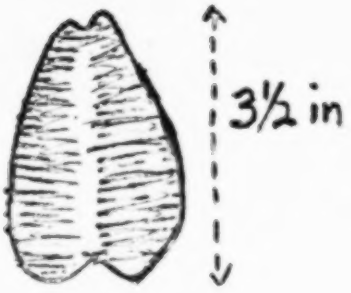
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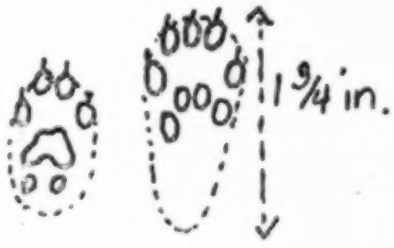
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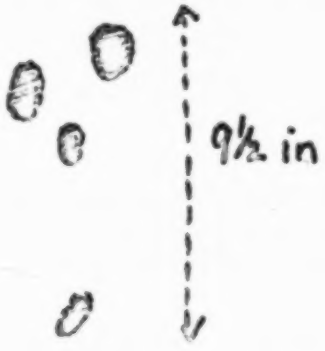
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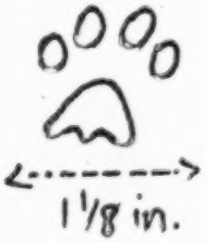
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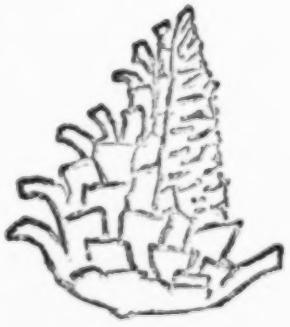


FOLLOW-UP #44 Animal Homes

On the bus:

Have one large size oaktag chart with a list of animals that may be seen in the area. The children could make the list prior to coming on the trip. While on the bus the children should look for animals. Each time one is seen, it is checked on the chart.

In the classroom:

Have the children make or draw animal homes from materials gathered around the school or home. This could be a very effective table display. Attach string from the animal's name to its home.

Read Bambi by Felix Salten. Discuss and compare the animals and their homes in the book with those actually in the woods.

FOLLOW-UP #45 Birds

Make a chart of birds seen or heard during the field trip after looking up further information in bird guides or other sources, and perhaps, listening to tapes or records of bird sounds.

Draw or paint pictures or make clay models of birds, trees, or other aspects of the area visited during the field trip. Write individual experience stories on drawings as child dictates.

Have your class bring in pictures or drawings of birds seen or heard during your trip.

Make a bird chart for comparison of birds in different seasons. Pictures of birds could be used, or children could make some from construction paper.

Discuss what makes a good home for birds and why.

Set up a bird feeder near your classroom for students to observe birds. Find out what kinds of food birds like to eat.

FOLLOW-UP #46 Spring Birds

Put O in front of anything you observed today.
Put R in front of anything you learned by reading.
Put H in front of anything you have heard someone say.
Put T in front of anything you think is true, but don't know where you learned it.
Put NT in front of anything you think is not true.
Put DK in front of anything you don't know.

_____ Birds sing in spring.

_____ Birds sing when on the ground.

_____ Birds sing from perches high in trees.

_____ There are more birds in the woods than in the field.

_____ Woodpeckers hammer on living trees as well as on dead ones.

_____ Robins eat worms.

_____ Some birds catch insects in the air.

_____ The male and female Baltimore oriole are not colored the same.

_____ An oven bird's nest looks like an oven.

_____ The male bird does more singing than the female.

_____ The female bird does all the work.

_____ All birds migrate.

_____ A bird with a thick heavy bill probably eats insects.

_____ Hawks can't see very well.

FOLLOW-UP #47 Birds in Habitats

What birds did you see in each of these places?

Field	Forest	Edge of Woods	Near Buildings

FOLLOW-UP # 49 Bird Identification

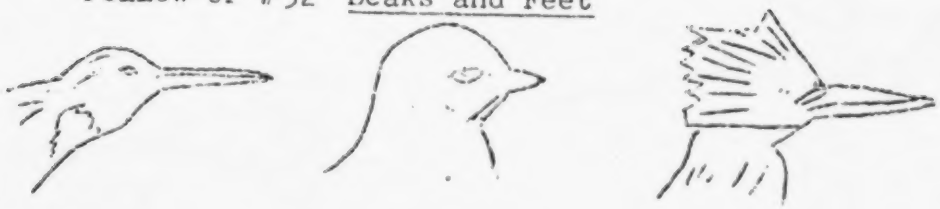
"Bird Identification Game"

Take large pictures of common birds and cut a mask to cover each bird. Cut circles which will expose beak, feet, tails.

One day show beaks:	Who can guess the bird by seeing just its beak? What kind of food would this bird eat?
Another day show feet:	Where would you be most likely to see this bird? Are his feet good for grasping twigs or trunks of trees? Can you tell anything about the way he would move on the ground?
Another day show tails:	Does this bird hold its tail up, down, or out? Does the tail have distinctive colors?
Another day show entire bird:	Review the functions of various beaks, feet, and tails. Is there any relationship between the type of beak and the kinds of feet and tails birds have?

FOLLOW-UP #52 Beaks and Feet

Bird Bills



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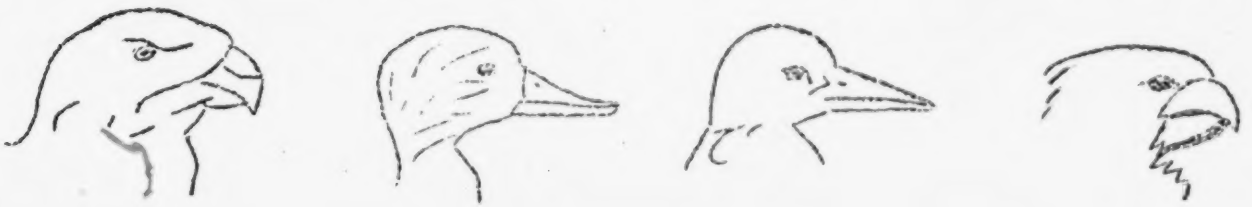

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_____ _____ _____ _____

Write the name of the bird and the food habit on the lines below each bird head.

Name of birds: Cardinal, Woodpecker, Kingfisher, Swallow, Hummingbird, Hawk, Duck

Food habits: Drills for insects, sips nectar, spears fish, cracks seeds, tears flesh, catches insects, sieves plants from water.

Bird Feet

Write what each foot is used for and the name of the bird. Choose from this list:

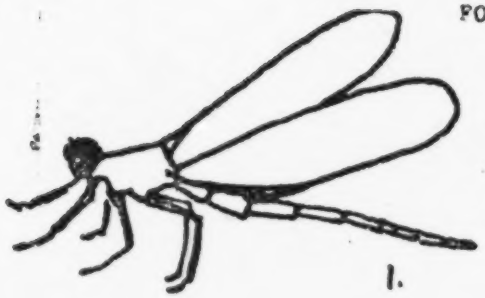
Use: Swimming, Perching, Catching live prey, Hanging onto tree trunks

Birds: Sparrow, Duck, Hawk, Woodpecker

From MY WEEKLY READER, Science Notebook Supplement, Issue 2, Ed.5, 9/15-19, 1958

FOLLOW-UP # 53

MARSH OR
STREAM ORGANISMS



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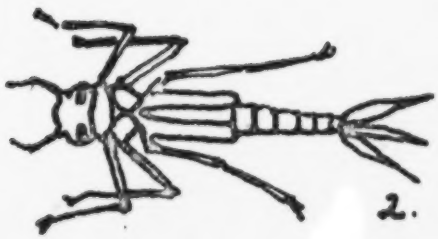

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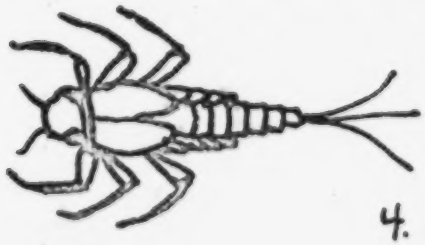

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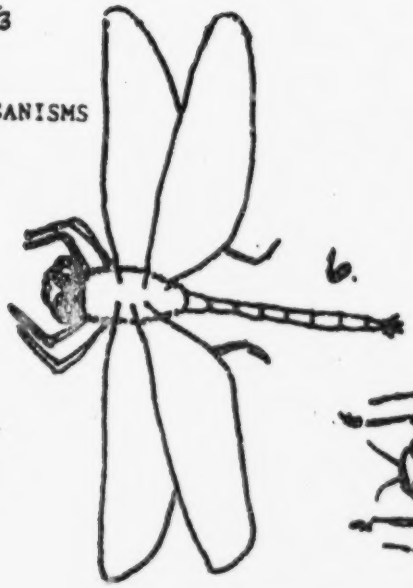

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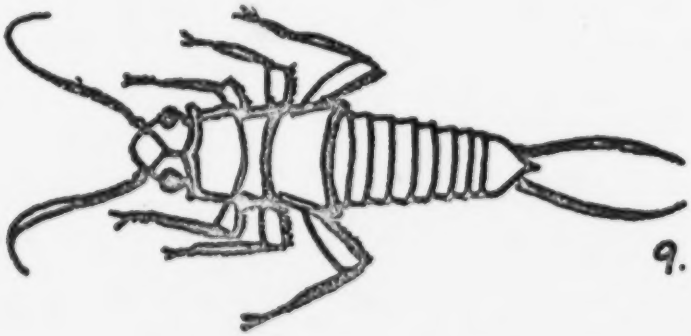

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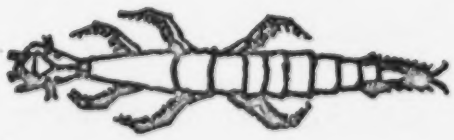

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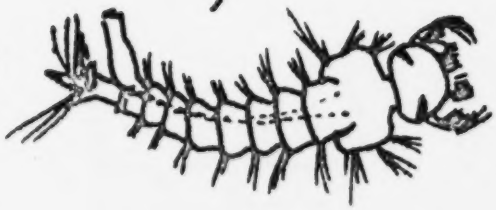

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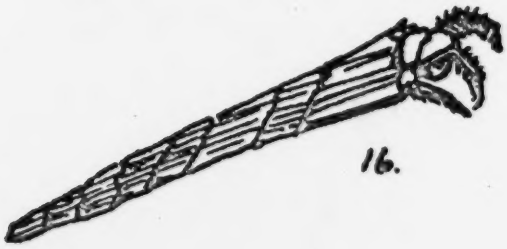

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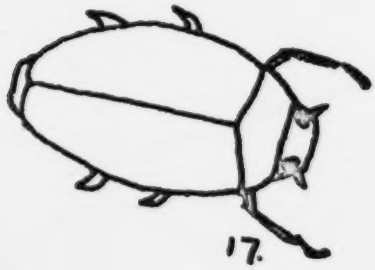

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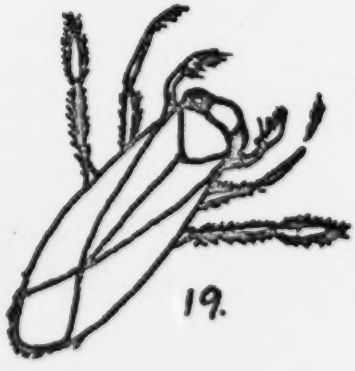

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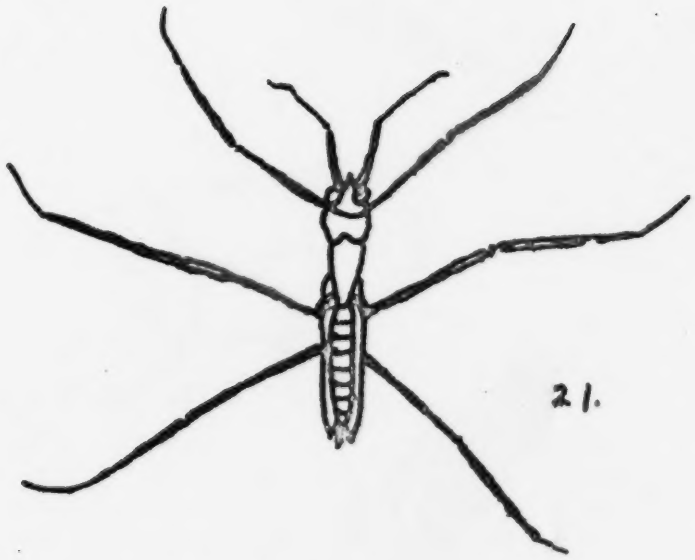

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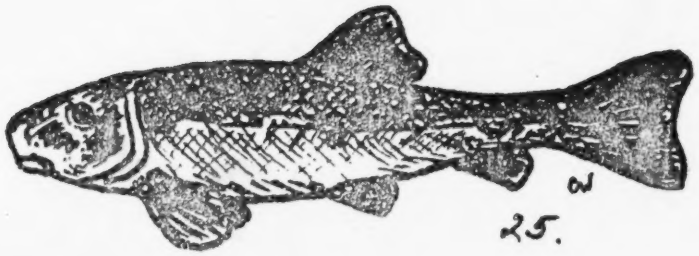

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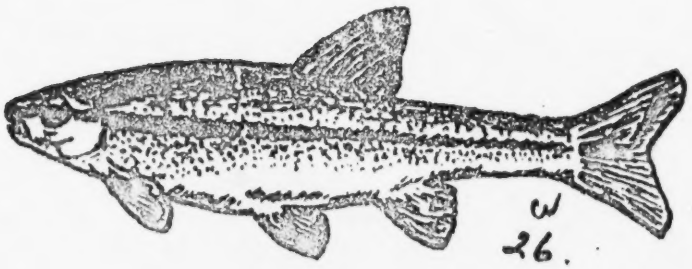

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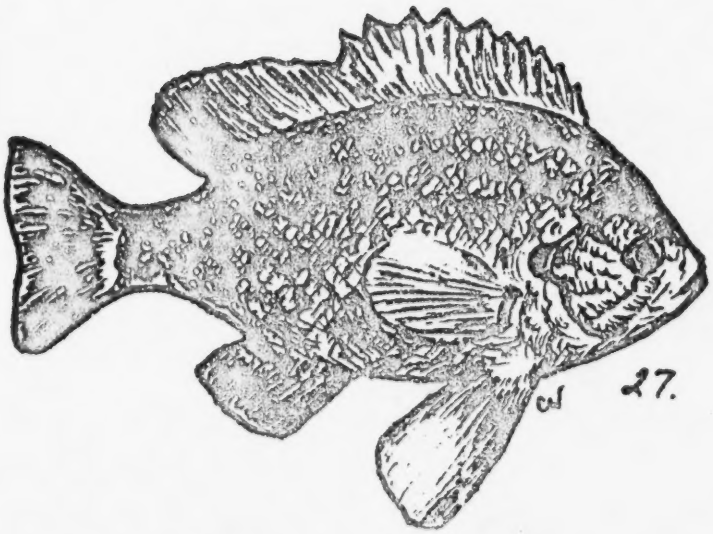

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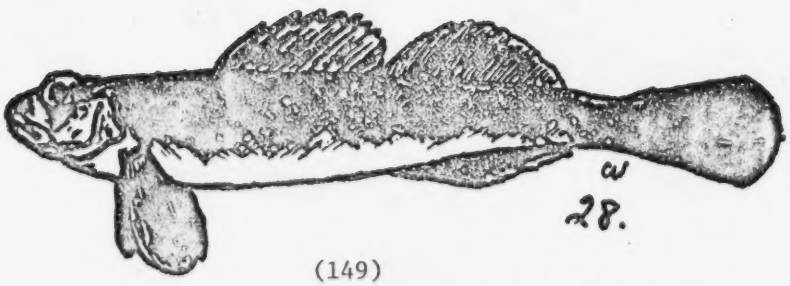

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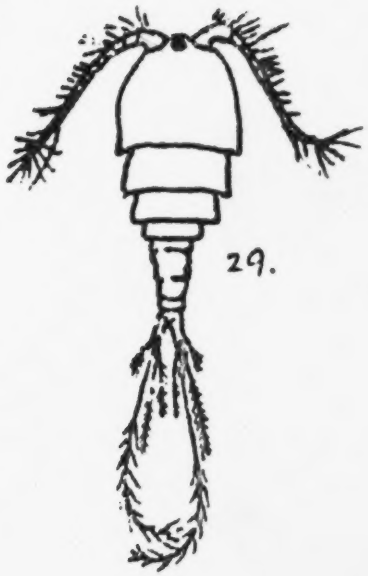

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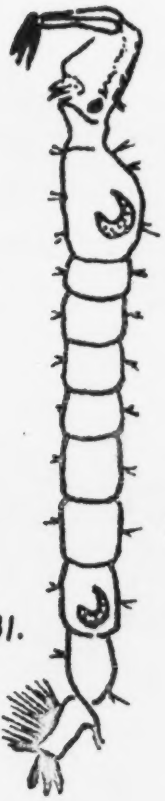

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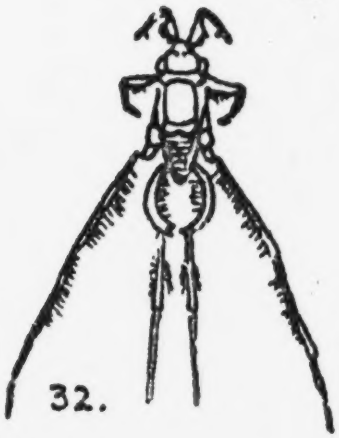

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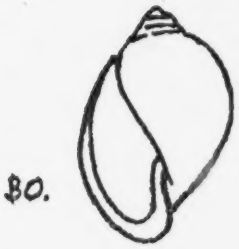

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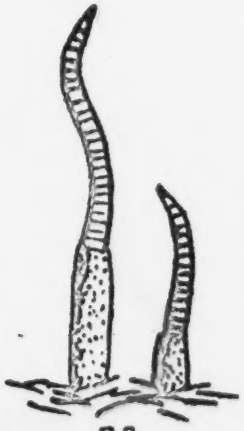

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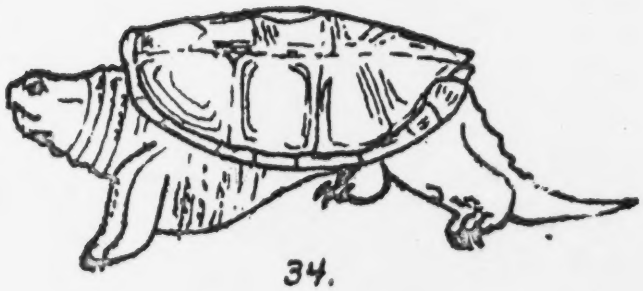

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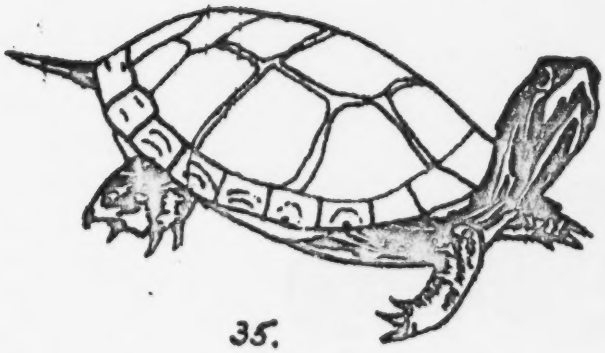

35.

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37.

POND LIFE

1. Damsel fly
2. Damsel fly larva
3. May fly
4. May fly larva
5. Diving beetle
6. Dragon fly
7. Dragon fly larva
8. Stone fly
9. Stone fly larva
10. Diving beetle larva
11. Mosquito
12. Mosquito larva
13. Mosquito pupa
14. Backswimmer
15. Caddis fly
16. Caddis fly larva
17. Whirligig beetle
18. Whirligig beetle larva
19. Water Boatman
20. Midge larva
21. Water strider
22. Tadpole
23. Midge
24. Giant water bug
25. Sucker
26. Black-nosed dace
27. Sunfish
28. Johnny Darter
29. Water flea
30. Snail
31. Phantom midge larva
32. Rheumatobates rileyi
33. Tubifex worms
34. Snapping turtle
35. Eastern painted turtle
36. Green frog
37. Pickerel frog

FOLLOW-UP # 54 Habitats

Below is a list of organisms usually found in these habitats. One of them is not usually found there. Which one is it? Explain your choice! Is there always one "right" answer or are there good arguments for several?

A Pond

fish, water lily, maple leaf, water strider, frog, bank swallow, tadpole, goldfish, back swimmer, grasshopper, dragonfly, mosquito

A Field

grasshopper, ash saplings, meadow lark, blackberry bush, grass, earthworms, pheasants, corn, sparrow, woodpecker, meadow lark, mockingbird, black snake, mouse, tractor, turtle.

A Woods

tree, boy, squirrel, dead log, beech tree, spice bush, wood aster, apple tree, mayapple, dead squirrel, spider, owl, chickadee, woodpecker, meadow lark, honeysuckle, termites, dead leaves, crow, rabbit, dog, woodchuck, deer.

FOLLOW-UP # 55 Raising Tadpoles

Place tadpoles in an aquarium containing water which has been obtained from a pond or stream, or which has been in the aquarium for several days before adding the tadpoles. If algae have already begun to form in the aquarium, or if a few plants are in it, so much the better.

Feed very young tadpoles commercially prepared fish food (beef meal is good) in small amounts daily.

Change water twice a week. Keep the aquarium where it will receive some sunlight and be at a fairly constant warm (60-65°) temperature.

Avoid overcrowding. Tadpoles develop faster when there are fewer of them in the aquarium.

You may want to experiment with rates of growth in two aquariums containing differing numbers of tadpoles.

When they begin to develop legs, put them in combination land-water aquariums, or provide a shelf upon which they can emerge.

Remember that when your tadpole is a frog, it will eat only moving insects or worms.

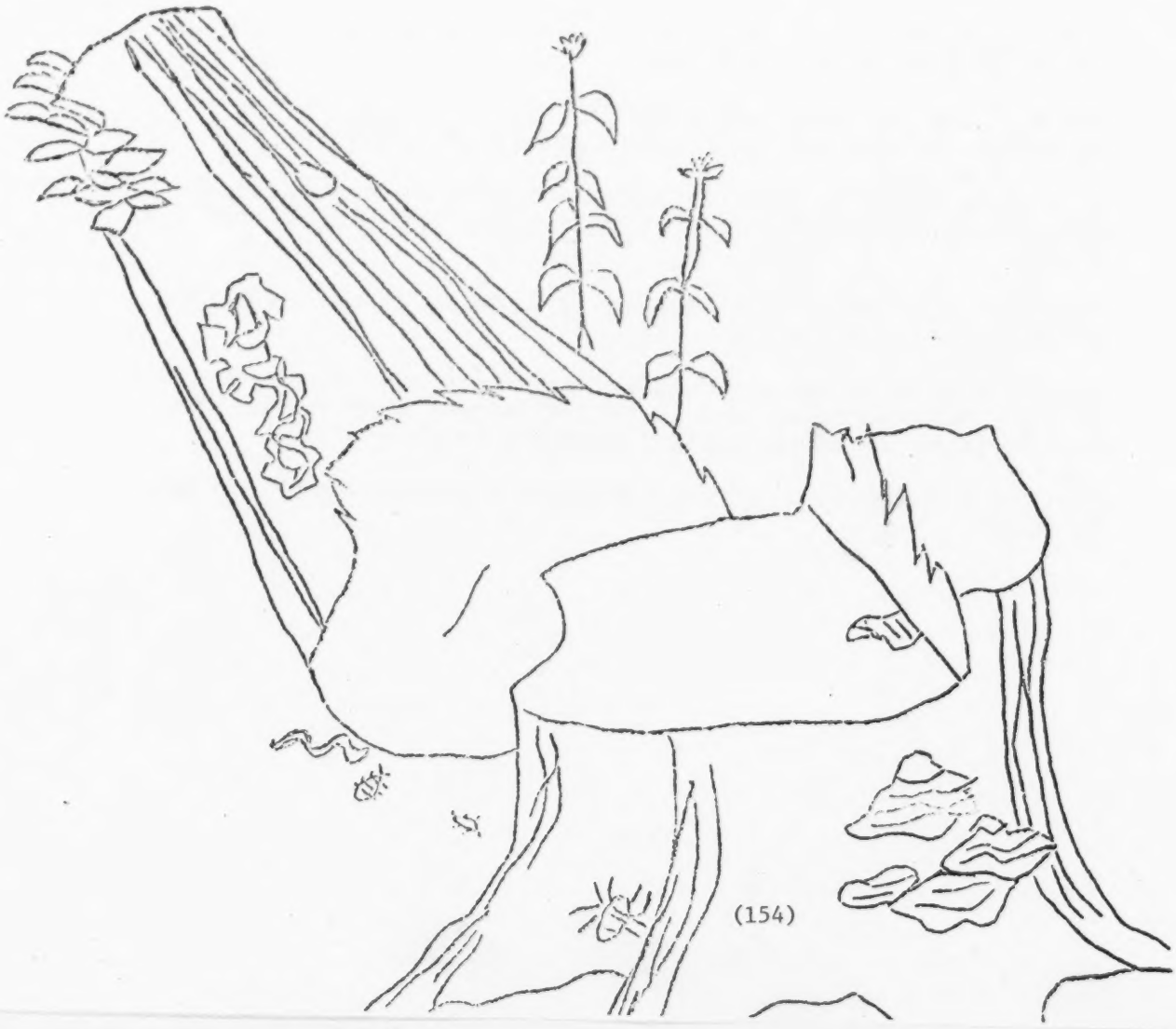
Large, wide-mouthed jars can be used in place of an aquarium. Be sure the water surface is at the widest part of the jar. Green plants are especially important in such a jar.

What sort of records of your tadpole's growth would you want to keep?

FOLLOW-UP # 56 Fallen Tree

How does a fallen tree contribute to the forest community? Circle all the clues you can find in the picture. (Be ready to tell what you think they tell.)

Add anything else you have observed living on, in, or near a fallen tree.



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FOLLOW-UP #57 OBSERVATIONS, INFERENCES: Woods, Trees

	OBSERVATIONS	INFERENCES
1.	There are very few leaves on the trees.	The trees are dead.
	There are many yellow leaves and red leaves on the ground.	It is winter.
	The air is cold (47°F.)	It is fall and the leaves have fallen from these trees.
2.	The trees are arranged in long, straight rows.	The trees were planted by man.
	The trees all have the same shaped leaves.	This is an apple orchard.
	The bark and leaves of all of the trees look & feel the same.	These trees are all of the same variety.
3.	The stump is very crumbly, spongy, and soft.	The insects killed the tree.
	There are some insects and grubs on and in the stump.	The tree and stump are an old beech tree.
	The soil around the stump is soft and tiny plants are growing in this	The stump has been decomposing for more than two months. (A few months)

Each set of three observations may be matched with an inference or inferences. Select what you consider the best (better) for each set of observations. Draw a line from each set to the inference (s) of your choice.

FOLLOW-UP # 58 Surface Tension

Fill a glass tumbler to the top. Drop by drop, continue adding water to the tumbler until the water "mounds". Drop one drop of detergent into the tumbler. What happens? Can you explain why?

Take a bowl of water and a dry steel needle. Float a piece of paper, such as paper toweling, on the surface of the water, then lay the needle on the paper. Wait for the paper to sink. (Why does it?) What happens to the needle?

(NOTE: If you have a steady hand and a pair of tweezers, you can try laying the needle directly on the water surface. Be sure not to let one end of the needle touch the water first.)

Now, add a drop of detergent. What happens to the needle? Why?

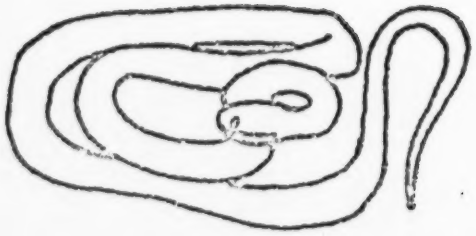
Will soap cause the same reaction as detergent? What other substances affect surface tension? What is the relationship between the effect of detergents on surface tension and the use of detergents as cleansers? If detergents are discharged into a stream, what will be their effects on the animal life of the stream? What is the difference between non-degradable and biodegradable detergent? How quickly are biodegradable detergents broken down? Can you set up some experiments which will give you first-hand data on this?

Try submerging various materials, such as velvet or the leaves of different plants (especially jewel weed,or if this is not available, try the common "weed", lamb's quarters). What do you notice? How might this be related to surface tension?

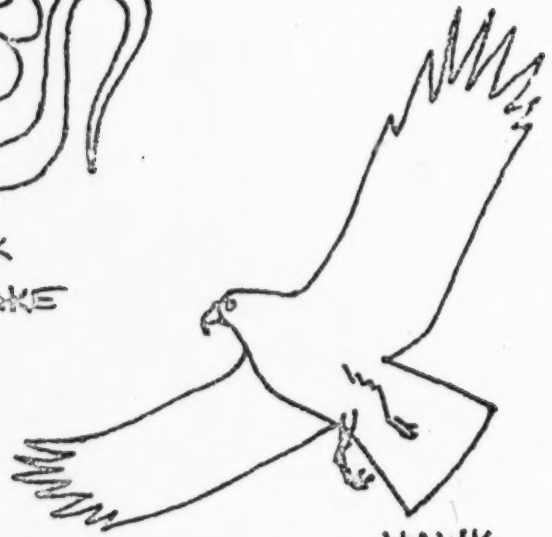
FOLLOW-UP #59 Meadow Food Chain

HOUSE MOUSE

TIMOTHY GRASS

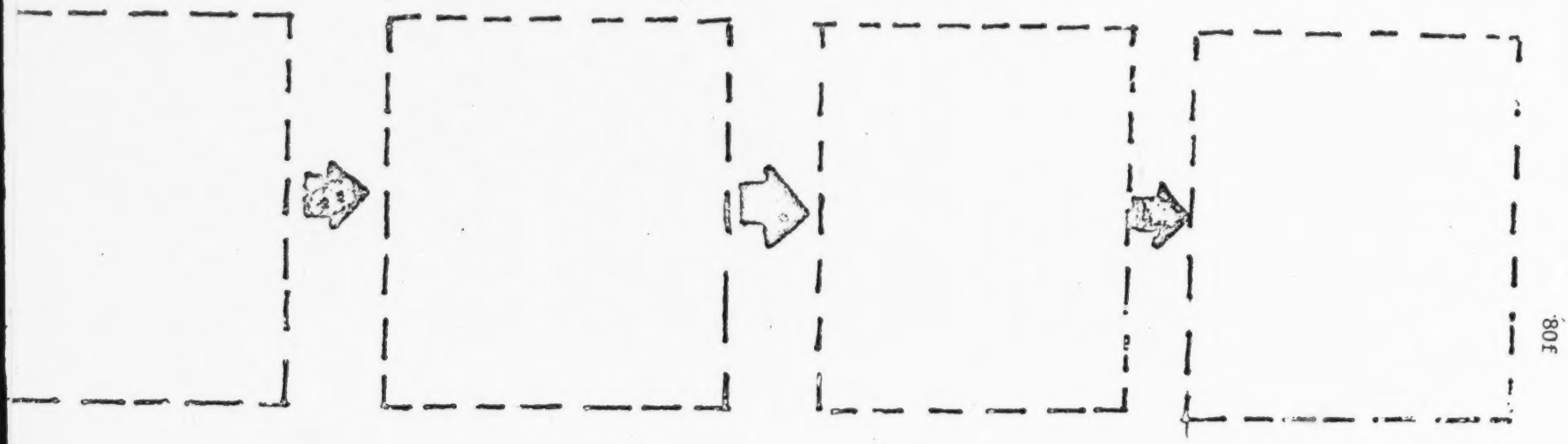


BLACK SNAKE



HAWK

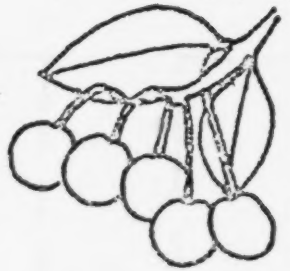
A MEADOW FOOD CHAIN



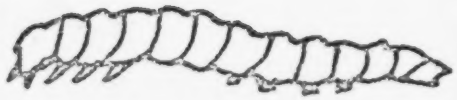
FOLLOW-UP #60 - Forest Food Chain

GREAT HORNED OWL

WOOD THRUSH



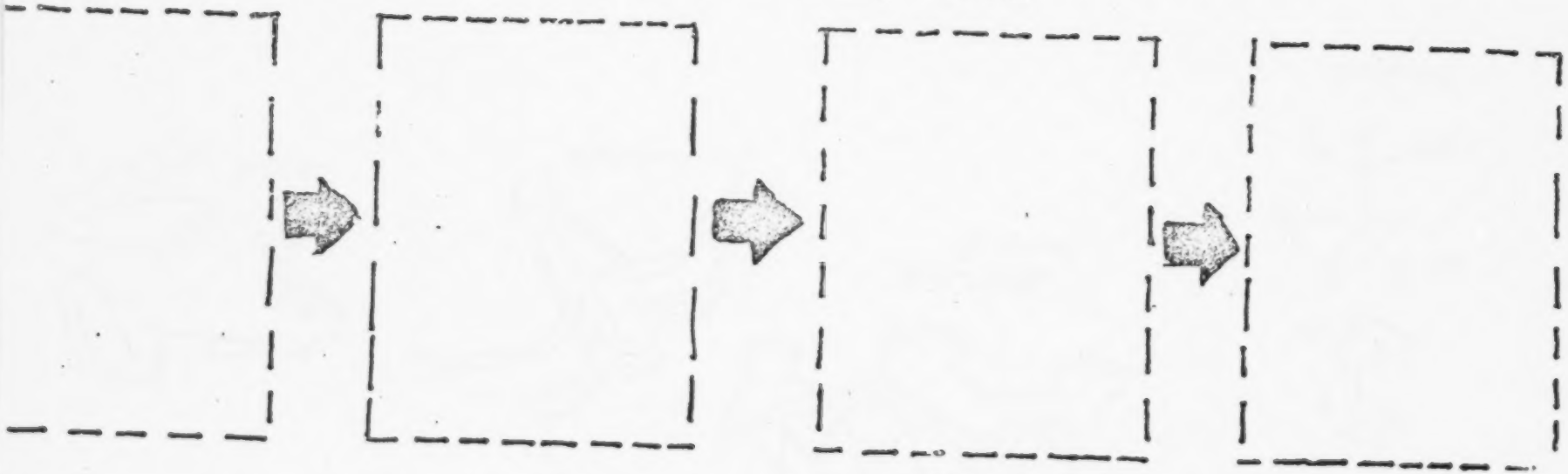
WILD CHERRY



CATERPILLAR

(159)

A FOREST FOOD CHAIN



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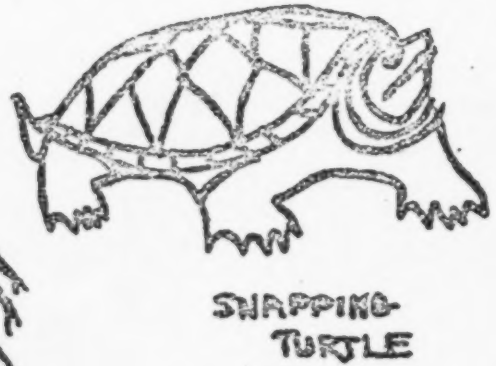
FOLLOW-UP #61
Aquatic food chain



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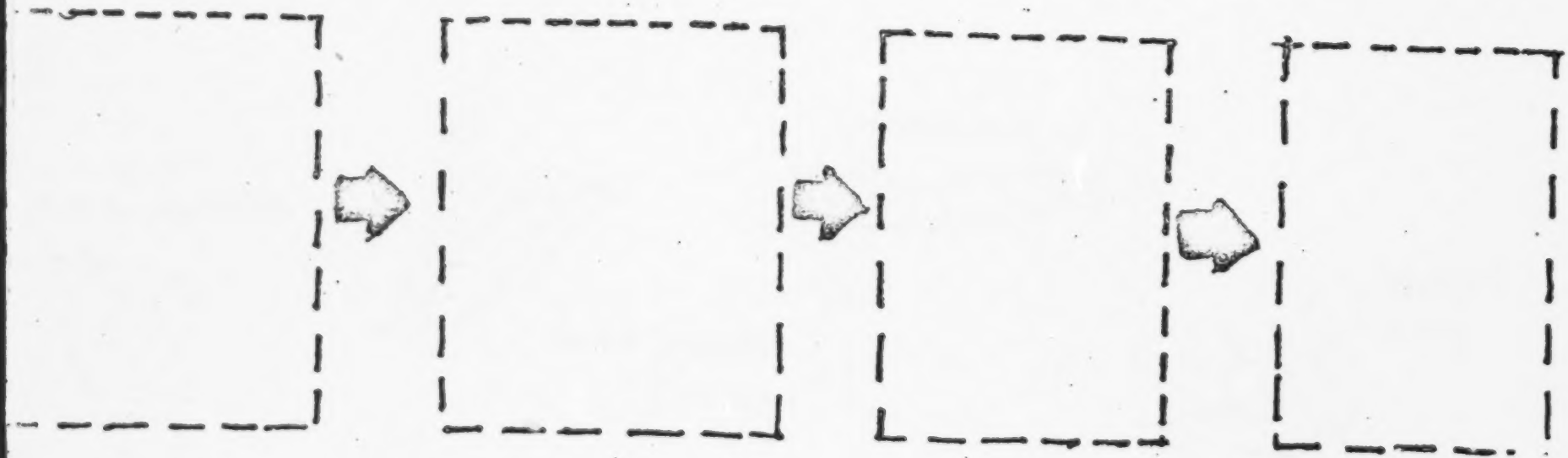
AQUATIC FOOD CHAIN



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LaBERGE

FOLLOW-UP #62 Marsh Food Chain

In the classroom:

On paper make three columns labeled Producers, Primary Consumers, and Secondary Consumers. List the plants and animals you saw during the field trip in the appropriate columns.

Make a bulletin board food chain. If each of your classmates draws several animals or plants seen at the pond, you can connect them with arrows to show what eats what.

Investigate food chains in your back yard, in the school yard, in a wooded area near you, in a corner lot, on a farm.

Set up a "hay infusion" for classroom study. Place a small handful of timothy hay in a large agate or pyrex saucepan, about 3/4 full of water (do not use metal). Bring to a slow boil and cook for 1/2 hour. Cool. Pour into aquarium or wide mouthed jars. When a scum begins to form on the top "inoculate" the infusion with a small quantity of water from a pond, marsh, or some other outdoor aquatic habitat. Be sure to include some debris: rotting leaves or twigs, mud from bottom. Replace the water that evaporates with distilled water. Keep aquarium cool and lighted, but avoid long periods of exposure to direct sunlight. An occasional pinch of powdered milk may be added if needed to provide food for bacteria.

An alternate study would be a jar of duckweed with snails. Keep this covered and in direct sunlight.

These provide a constantly changing population of microscopic organisms for study. Topics for investigation could include:

Why does the population of paramecia, etc. increase and then drop?
What will happen if we introduce many more snails? remove the snails? add goldfish?

What happens when oil is spread on the surface of a pond to kill mosquitoes? Experiment with a drop of oil on one of the hay infusions. What organisms besides the mosquito larvae would eventually be affected? Why?

What happens when an insecticide is used? Which has more widespread effects, the insecticide or the oil? What are the advantages and disadvantages of both?

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FOLLOW-UP # 63 Pond Data Sheets

Water Temp:
Date:

PLANT LIFE

	Description	Color	Size	Sketch	Name	Other Notes
1.						
2.						
3.						
4.						
5.						
6.						

Water Temp:
Date:

85f

FOLLOW-UP # 63 Continued

INSECTS, AMPHIBIANS, OTHER POND LIFE

Size	Color	No. of Legs	No. of Wings	Sketch	Name	What does it eat?	Other Notes

FOLLOW-UP #65 Pond Succession

If the entire class cannot visit other pond (or marsh) environments, encourage individual students to do so and compare on-site observations with those made during their pond study.

Collect seeds of the types seen floating on the pond. Will they germinate in water? if planted in soil under water? in very wet soil?

What is the difference, if any, between a marsh, a swamp, and a bog? How would you interpret the past history of each of these areas? What would you predict for their futures?

FOLLOW-UP #66 Pond Water

Collect pond water in large jars. (Ask the school cafeteria for wide mouth gallon or two gallon jars). Take several samples from different areas, but don't specifically collect a lot of animals - just take some water, some of the "slime" present,some plants, if they are in abundance, and some of the bottom mud or dead leaves. Some jars could contain water from a mud puddle, a rain barrel, or any source of untreated water. Leaves or dry grass may be added to some jars. Chemically treated tap water should never be used because it kills organisms in the water.

These jars should be examined closely by the class, using hand lenses and microscopes as well as any other available means of observation. They should be carefully labeled as to the date and location of collection. Lids should be placed loosely on the tops so as to retard evaporation without shutting out oxygen, then the jars should be kept in convenient places, which also may vary. Direct sunlight, for instance, would encourage plant growth but decrease the growth of bacteria and hence the microorganisms feeding on them.

It might take a few observations of the water in the jars to see living things during first few days. After a week or two however, changes should be occurring at a comparatively rapid rate as the protozoa develop and the larger insect larvae or whatever you have die off. Protozoa are not easy to identify, and it is not really important to name them exactly. A descriptive name serves communication within the group and common ones may be identified using any of numerous books on the subject. You will probably find however, that no book encompasses the variety of life you will be able to find in your cultures.

The class should keep a notebook recording the changes observed and dates of the observations of each jar. Physical observations such as temperature and ph should also be recorded as well as the more obvious changes in odor, clarity of water, color etc. As the succession of organisms changes and a more stable condition developes, observations may lapse to one a month, but new and interesting changes have been seen in such cultures maintained without care for years. A challenge arises as to determining the reasons for each observed change in the jars.

FOLLOW-UP # 67 After the Rain

On the bus

What did you like about being outdoors in the rain?
What was the most interesting thing you discovered?
What would you like to do in the rain the next time?

Watch for people and animals that are out in the rain.
How are they prepared for the rain?
Do they seem to enjoy being in the rain? Why do you think so?
What usual things are people and other animals not doing because it is raining?

Listen to rain sounds on the highway. What makes these sounds?

How does the rain affect the colors of the roads, the buildings, the cars, that you see?

Watch for creeks, waterfalls. If you have passed by streams recently, compare the amount of water you see today with what you saw then.

Watch for "surprise waterfalls" in places where there usually aren't any.

In the classroom or at home

Draw a picture of the surface of the pond in the rain.
What color paper would you use?

Where are the neighborhood puddles? Why?
Is it good or bad that puddles form in these places?
What else is in the puddles besides water? Where did it come from?

Study a topographical map of your community and the surrounding area.
Where does the water go that you saw in the creeks? Why?
Where will the water from the pond go?

Pour water on different kinds of surfaces.
Does the surface get "wet all over" or does the water bead?
What can you find out about the surface that helps explain this?

Why does your mother wax the kitchen floor?
Why does your dad wax the car?
Help them next time and repeat your experiment.

What happens when you submerge the leaves of different kinds of plants?
How does being wet affect the appearance of other things: cloth, wood, blackboard, clay, etc.? Can you find out why this happens?

How does being wet affect the smell of things: chalk? the blackboard? window screens? wool? Why might this be?

Burn some leaves under the supervision of your teacher or parents. Pour water on the ashes. Try to describe the smell.

Explore your back yard or the schoolyard the next time it rains. What new discoveries can you make?

Catch and measure raindrops. (See How Big Are Raindrops by Phyllis Busch)

After a rain dig into the earth at different spots.
How deep did the rain go?
Are all places wet to the same depths?
What seems to have caused the differences?
What effect do these variations have on plants and animals?
Repeat this activity at different seasons of the year, after similar rains.

Arrange a bulletin board display of rain pictures.

Read poems about the rain. Try writing some.

Watch the film "Rainshower".

Compare the leaves of plants you saw in the rain with the same types of leaves when dry.
Can you find clues in the texture that suggest why water beads, or does not bead, on each?
(Interesting leaves to observe are clover, mullein, thistle, hawkweed, lamb's quarters, barberry, spirea, roses, different kinds of grasses.)

What is rain?

Collect some in a sterilized jar, cap it, and observe it for several weeks.
(How to sterilize a jar: Heat it in an oven or ask your mother to tell you how she sterilizes jars for preserves.)

If you have a camera, try taking pictures just after a rain. Perhaps you can take a picture of a puddle or a spiderweb spun of raindrops or leaves wearing diamonds.
No camera? - pen and ink, a pencil, some colored chalk can be your challenge.

FOLLOW-UP #68 Wind

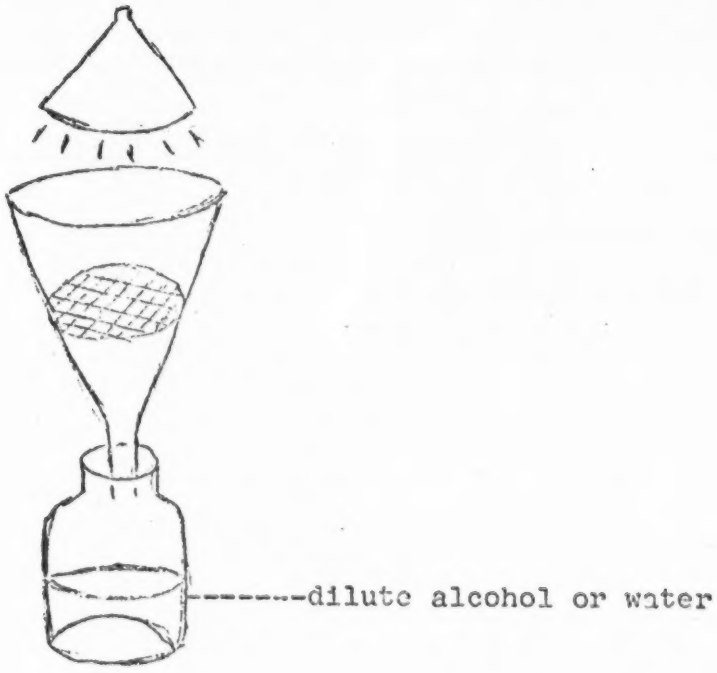
Do buildings sway in the wind? Do flagpoles? Do electric and telephone poles? What would happen to a tall, rigid object that did not sway? Can you design an experiment to demonstrate this?

Investigate the construction of the Empire State Building. How can a building with a steel framework be flexible?

Read Robert Frost's "The Birches".

Read R. L. Stevenson's "Windy Night".

FOLLOW-UP # 70 Berlese Funnel



Many more insects and related organisms are found in soil or humus than can be seen even by close examination. Using the Berlese Funnel is a technique for the removal of these living things from the soil. A funnel can be made of construction paper or cardboard lined with aluminum foil or any comparable material. Glass chemical funnels or metal funnels from the hardware store may be used. The funnel is held under a lamp by a ring stand, or other holding device, with its end in a jar containing water or water and alcohol.

If soil or leaf mold is placed on a square of screening in the funnel and the light is left on overnight or longer, the insects in the material will move to lower levels in the soil or leaf mold as it dries and eventually into the water or alcohol where they may be studied at leisure.

FOLLOW-UP #73 Rocks and Minerals

Encourage students to begin a rock collection of small specimens. An egg carton is a good container. The lid of the box should contain information about each specimen. For example:

Specimen #1, Milky Quartz, Middletown

Bringing collections to school allows students to swap specimens with their classmates.

A good magazine for young people to subscribe to is Rocks and Minerals.

FOLLOW-UP # 75 Using Your Senses

Use your senses to find items to be placed in the proper category. Perhaps you can find some things that should be placed in more than one category.

SOUND	SMELL	FEEL	SIGHT

FOLLOW-UP #76 Observation Lotto

When you see an object which is on this sheet, put an X in the square.

Bird House	Pine tree	Bird Bath	Squirrel
Robin	Bird Feeder	Eroded Land	Flock of Birds
Soil that looks like clay	Bird nest	Crow	Creek or stream
Tulip tree	Decomposition	Litter	Wild Flower
Domestic animal	Tree with reddish color leaves	Flower Garden	Open field
Hollow tree	Fisherman	Sign of air pollution	A cover for wild animals
Deciduous tree	A child playing outdoors	Bulldozer clearing the land of trees	Dogwood tree
a safe place to play	Tree with no leaves	A sapling	Parking lot
"No trespassing" sign	Fire Hydrant	Unpaved road	Apartment house
Pond	Something you think is pretty	Hear a bird singing	Something special

FOLLOW-UP #77 Any Bus Trip

Activities that could be used before arriving: (or after the trip)

1. Count natural areas that you pass on the way.
2. Count the number of different kinds of animals that you pass on the way.
3. Count the number of different kinds of plants that you pass on the way.
4. Count the signs of littering that you see along the way.
5. Count the eroded areas that you see.
6. Count the number of billboards you see along the way.

Activities that could be used after the trip:

1. Provide several "mystery bags" with organisms, parts of organisms, non-living things that were seen on the trip. Students can pass them around to feel, shake, etc. in order to identify them. Include soft drink bottles, can, etc.
2. Look for "carry-overs" from the trip: seed "hitchhikers" stuck on clothing, ticks from spring trips, etc.

FOLLOW-UP #79 On The Bus

Some outdoor-oriented activities which may be used on the bus trip to or from the study area are described below.

ALPHABET GAME

Divide the class into 2 teams.
Each team watches for nature objects beginning with consecutive letters of the alphabet, such as "apple tree, bluejay, creek..." Whichever team completes the alphabet first wins.

You may want to limit the subjects to the trip activity, such as birds, animals, but this will make it more difficult.

" I WENT TO THE ENVIRONMENTAL LABORATORY AND I SAW..."

Start the game by saying, "I went to the Environmental Laboratory and I saw a grasshopper."
Each child in turn repeats the beginning of the sentence and adds on another thing seen, as "I went to the Environmental Laboratory and I saw a grasshopper and a bluebird."
You may wish to make the list alphabetical.

" I SPIED"

Children may take turns describing something seen during their field trip. The child who guesses what is being described gets to describe the next object.
This may be done in team form.

WATCHING FOR POINTS

In advance, make a list of nature objects which may be seen from the bus. Give each a point value. Divide the class into two teams (one on each side of the bus, or where two children are sitting in a seat, they may compete). Points are given to the team sighting each object first.

In advance make up a list of various map symbols. Give each symbol a point value. As the bus passes landmarks which would be identified by symbols on the list, children check off the symbols. At the end of the trip the team (or individual) having the highest score wins. (Children should be prepared to tell where they saw a landmark if their scores are challenged.)

LISTS

Divide the class into teams. Give the captain of each team a pencil and paper. In a given period of [illegible] team make a list of all the sounds heard, or [illegible] or all the describing words that could be [illegible] something seen, etc. The team having [illegible]

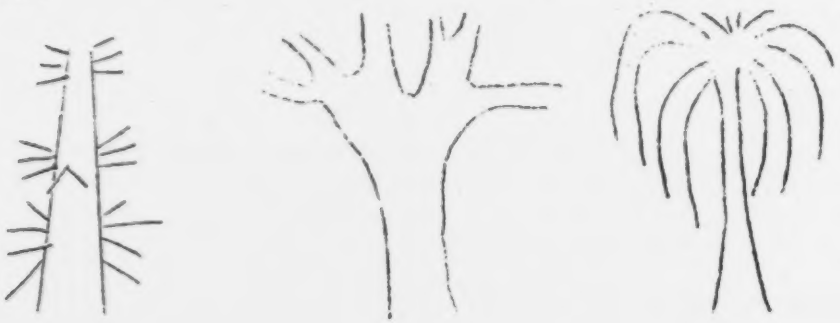
FOLLOW-UP # 81 Feelings in the Forest

You have just visited a pine forest!

Circle the answers you like best in these questions about it. (Your classmates may not agree with you. Could you tell them why you chose the answers you did?)

1. The pine tree "rows" were arranged like this:

2. Looking up at a pine tree in the plantation gave me this idea:



3. The pine forest made me think of the colors

   white black red grey blue green gold

4. In the pine forest I think I heard

   rustling leaves creaking wood many birds singing near me

   birds at a distance the wind in the branches

5. Walking through the pine forest was like walking on

   sawdust eggshells marbles the sidewalk a gravel road

6. In the pine forest, the time of day seemed to be

   going-to-school time noon late afternoon evening

7. In the pine forest I thought of
Fourth of July Easter Halloween Christmas Summer vacation Thanksgiving

8. In the pine forest I wanted to
run and shout walk quietly sit down and read a book
lie down and take a nap go camping play hide and seek

9. The pine forest makes me think of such stories as
Hansel and Gretel Bambi Cinderella Black Beauty
Snow White and the Seven Dwarfs Lassie Robin Hood

10. In the pine forest I would like to listen to the music of
a brass band a flute a piano drums a violin, an oboe

11. I would like to visit the pine forest again
in a storm alone at night on a hot summer afternoon
after a snowstorm alone on a dark afternoon when a storm is coming
while snow is falling never

12. I think if I visited the pine forest alone I might see
snakes deer bears spiders owls raccoons

13. I hope our class
comes back to the pine forest again goes to some other woods
doesn't take another field trip

14. The best kind of field trip is one to
a museum a post office, bakery or other business place
the out-of-doors a baseball or football game

FOLLOW-UP # 82

DROP COOKIES

1 cup butter
2 cups honey
2 eggs
1 3/4 cups flour
1 teaspoon soda
1 teaspoon baking powder
1/2 teaspoon salt
1 teaspoon cinnamon
2 cups rolled oats
1 cup raisins
1/2 cup chopped walnuts

If you were given 50 acres of bare soil, what would you have to plant and what animals would you have to raise before you could bake these cookies?